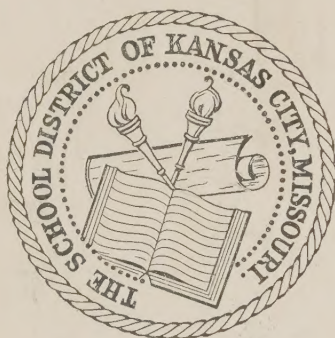




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PROCEEDINGS  
AND  
JOURNAL  
OF THE  
AMERICAN GEOGRAPHICAL SOCIETY  
OF  
NEW YORK.

MDCCCXC



VOL. XXII.

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# AMERICAN GEOGRAPHICAL SOCIETY.

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## OFFICERS AND COUNCILLORS

1890.

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EDWARD KING.



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# CHARTER OF INCORPORATION.

---

GRANTED APRIL 13, 1854.

---

*The People of the State of New York, represented in Senate and Assembly, do enact as follows :*

SECTION 1. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of "The American Geographical and Statistical Society," for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed ; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments, and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and a treasurer and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering

the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or of the United States, which code, when formed and adopted at a regular meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

5. The Legislature may, at any time, alter or repeal this act.

6. This act to take effect immediately.

---

STATE OF NEW YORK, } ss.:  
Secretary's Office,

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this  
[L. S.] thirteenth day of April, one thousand eight hundred and fifty-four.

A. G. JOHNSON;

*Deputy Secretary of State.*

## AMENDED CHARTER.

---

PASSED APRIL 8, 1871.

---

STATE OF NEW YORK, NO. 237, IN SENATE. *March 7, 1871.*—  
Introduced with unanimous consent, by Mr. Bradley; read twice,  
and referred to the Committee on Literature; reported favorably  
from said committee, and committed to the Committee of the  
Whole.

### CHAP. 373.

AN ACT in relation to The American Geographical and Statistical  
Society.

PASSED April 8, 1871.

*The People of the State of New York, represented in Senate and  
Assembly, do enact as follows :*

SECTION 1. The name or corporate title of the said Society shall  
hereafter be The American Geographical Society of New York.

§ 2. The object of the said Society shall be the advancement of  
geographical science; the collection, classification and scientific  
arrangement of statistics, and their results; the encouragement of  
explorations for the more thorough knowledge of all parts of the  
North American continent, and of other parts of the world which  
may be imperfectly known; the collection and diffusion of geo-  
graphical, statistical and scientific knowledge, by lectures, printed  
publications, or other means; the keeping up of a correspondence  
with scientific and learned societies in every part of the world, for  
the collection and diffusion of information, and the interchange of  
books, charts, maps, public reports, documents, and valuable publica-



tions ; the permanent establishment in the city of New York of an institution in which shall be collected, classified, and arranged, geographical and scientific works, voyages, and travels, maps, charts, globes, instruments, documents, manuscripts, prints, engravings, or whatever else may be useful or necessary for supplying full, accurate, and reliable information in respect to every part of the globe, or explanatory of its geography, physical and descriptive ; and its geological history, giving its climatology, its productions, animal, vegetable, and mineral ; its exploration, navigation, and commerce ; having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage, and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income, or its personal estate generally, so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act ; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

---

STATE OF NEW YORK, }  
Office of Secretary of State, } ss. :

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this twenty-  
[L. s.] second day of May, in the year one thousand eight hundred and seventy-one.

DIEDRICH WILLERS, JR.,  
*Deputy Secretary of State.*

# BY-LAWS.

---

## CHAPTER I.

### TITLE.

The title of the Society is, "The American Geographical Society."

## CHAPTER II.

### OBJECTS.

The objects of the Society are, "The collecting and diffusing of geographical and statistical information."

## CHAPTER III.

### MEMBERS.

1. The Society shall consist of Fellows, Honorary, Corresponding, and *ex-officio* members.
2. Honorary members shall be chosen on account of their distinction in the science of geography or statistics, and not more than twelve of them shall hereafter be elected in any one year.
3. Corresponding members shall be chosen from those who have aided the advancement of geography or statistics.
4. *Ex-officio* members shall be foreign diplomatic representatives and consuls resident in the United States ; and United States diplomatic representatives and consuls in foreign countries.
5. Fellows and Corresponding and Honorary members shall be elected as follows : All nominations of candidates shall be openly made in writing at a meeting of the Society, or the Council, by a member thereof, and, together with the name of the member making them, entered on the minutes. The persons thus nominated, when

approved by the Council and elected by the Society, shall, on payment of the initiation fee, if nominated as Fellows, and without such payment if nominated as Corresponding or Honorary members, become members of the Society accordingly.

6. Persons entitled to become *ex-officio* members of the Society shall, on the recommendation of the Council, be, by the Society, constituted and declared to be such members.

7. The name of any member of the Society may, on the recommendation of the Council, and by a vote of two thirds of the members present at a stated meeting of the Society, be dropped from the roll of its members.

#### CHAPTER IV.

##### INITIATION FEE AND ANNUAL DUES.

1. The initiation fee, including the dues for the current year, shall be, for a Fellow, ten dollars, to be paid immediately on election.

2. The annual dues thereafter shall be, for a Fellow, ten dollars, to be paid in advance.

3. Any Fellow of the Society, not in arrears, may commute for life all dues for fellowship by the payment at one time, if a Fellow, of one hundred dollars.

4. The name of any Fellow of the Society neglecting for two successive years to pay his annual dues, or at any time wholly refusing to pay them, may by the Council be erased from the list of Fellows of the Society.

5. The fiscal year of the Society shall, for all purposes, be the calendar year—that is, commence on the first day of January, and end with the 31st day of December in each year.

#### CHAPTER V.

##### OFFICERS.

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, a treasurer, and fifteen councillors; and these, together, shall form the Council of the Society.

2. The officers and members of Council elected at the next



annual election (except the president and treasurer) shall, at their first meeting, divide themselves into three classes, each to embrace one vice-president, one secretary, and five members of the Council ; one of which classes shall hold office one year, one for two years, and another for three years, to be determined at said meeting by lot or otherwise. The president and treasurer shall always be elected annually ; and at each annual election thereafter there shall be elected a vice-president, a secretary, and five members of Council, each for the term of three years.

3. All officers of the Society to be chosen at any election may be voted for on one ballot.

## CHAPTER VI.

### ANNUAL MEETING.

1. The annual meeting of the Society shall be held on the second Tuesday after the first day of January in each and every year hereafter, when the annual election of the officers of the Society shall take place ; and if, from any cause, there shall be a failure of the annual election at the time above designated for that purpose, the same may be held on the Tuesday next following—that is, on the third Tuesday after the first day of January in each year—and of which due notice shall be given.

2. Every member of the Society, who has been such for twenty days or more, and who is not in arrears for his dues for the past year, shall be entitled to vote at the said election.

3. At the annual meeting of the Society the Council shall present a general report of its proceedings and of those of the Society during the past year, and the secretaries and the treasurer shall also present their annual reports.

## CHAPTER VII.

### MONTHLY AND SPECIAL MEETINGS.

1. The Society, unless otherwise specially ordered by the Society or the Council, shall hold its stated meetings for the transaction of business on the second Tuesday of each month of the year, except July, August, and September.

2. The president, or, in his absence, one of the vice-presidents, may, and upon the written request of five members, shall, call a

special meeting of the Society by giving three days' notice thereof in two daily newspapers published in the city of New York.

## CHAPTER VIII.

### ORDER OF BUSINESS.

1. At all stated meetings of the Society for the transaction of ordinary business the order of proceedings shall be as follows :

1. Reading of the Minutes.
2. Reports and Communications from Officers of the Society.
3. Reports from the Council.
4. Reports from Committees.
5. Nominations of Members.
6. Special Orders.
7. Unfinished Business.
8. Miscellaneous Business.
9. Papers Read and Addresses Delivered before the Society.

2. All propositions presented for the action of the Society at any of its meetings shall be in writing, when requested by the presiding officer or any member. A proposition thus presented, when seconded and the question thereon stated from the chair, shall be deemed to be in the possession of the Society and open for discussion, but may be withdrawn by the mover at any time before amendment or decision.

3. No member shall speak more than once upon the same question until all the other members present desiring to speak shall have spoken, nor more than twice on any question without leave of the Society.

## CHAPTER IX.

### QUORUM.

At all meetings of the Society nine members present shall constitute a quorum for the transaction of business.

## CHAPTER X.

### COMMITTEES.

All committees authorized by the Society shall, unless otherwise specially ordered, consist of three members each, and be appointed by the presiding officer.

## CHAPTER XI.

## PRESIDING OFFICER.

At all meetings of the Society, on the arrival of the appointed hour and the presence of a quorum, the president, or in his absence one of the vice-presidents, or in the absence of both a chairman *pro tem.*, shall immediately take the chair, call the meeting to order, and preside. He shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. He shall also, unless otherwise specially ordered, appoint all committees authorized by the Society ; and at every annual election, before the opening of the polls, he shall appoint two tellers of the election.

## CHAPTER XII.

## SECRETARIES.

1. Foreign Corresponding Secretary.—It shall be the duty of the foreign corresponding secretary to conduct the general correspondence of the Society with individuals and associate bodies in foreign countries.

2. Domestic Corresponding Secretary.—It shall be the duty of the domestic corresponding secretary to conduct the Society's general correspondence with individuals and associate bodies in the United States.

3. Both the foreign and domestic secretaries shall keep in suitable books to be provided for that purpose, at the Society's rooms, true copies of all letters written by them respectively on behalf of the Society ; and shall preserve, on proper files, at the said rooms, all letters received by them on the same account ; and at each stated meeting of the Society or the Council, they shall respectively report their correspondence, and read the same, or such parts thereof as may be required.

4. In case of vacancy in the office of either of the corresponding secretaries, or in the absence or disability of either of these officers, the duties of both may be performed by the other corresponding secretary.

5. The Society may designate a particular officer, or appoint a committee to prepare a letter or letters on any special occasion.

6. Recording Secretary.—It shall be the duty of the recording



secretary to give due notice of the time and place of all meetings of the Society, and to attend the same. He shall keep fair and accurate minutes of the proceedings of the Society, and record the same, when approved, in the Society's Journal. He shall give immediate notice to the several officers and committees of the Society, of all votes, orders, resolves, and proceedings of the Society affecting them or appertaining to their respective duties. He shall prepare a list of the members of the Society entitled to vote, to be handed to the tellers before the opening of the polls at each annual election. He shall officially sign and affix the corporate seal of the Society to all diplomas and other instruments or documents authorized by the Society or Council. He shall have charge of the corporate seal, charter, by-laws, records, and general archives of the Society, except so far as they may be expressly placed under the charge of others. He shall certify all acts and proceedings of the Society, and shall notify the Council of the death, resignation, or removal of any officer or member of the Society. He shall have charge of the rooms of the Society, and shall perform all such other and further duties as may from time to time be devolved upon him by the Society or the Council. He, together with the Council, shall have the charge and arrangement of the books, maps, and collections belonging to the Society. He shall cause to be kept in the rooms of the Society a registry of all donations to the library or collections of the Society, acknowledge their receipt by letter to the donors, and report the same in writing to the Society at its next stated meeting.

7. All documents relating to the Society and under the charge of the secretaries respectively, shall be placed in such depositories in the rooms of the Society as the Council may provide and designate for that purpose.

## CHAPTER XIII.

### TREASURER.

The Treasurer shall have charge of and safely keep all contracts, certificates of stock, securities, and muniments of title belonging to the Society. He shall collect the dues and keep the funds of the Society, and disburse the same under the direction of the Council; and so often as the said funds in the hands of the treasurer shall amount to one hundred dollars, he shall deposit the same, in the

name of the Society, in some incorporated bank in the city of New York, to be designated for that purpose by the Council ; and the said funds, thus deposited, shall be drawn out of the said bank on the check of the treasurer, countersigned by the chairman of the Council, and only for the legitimate and authorized purposes of the Society. The treasurer shall, previous to the annual meeting of the Society, prepare and submit to the Council for audit, a detailed account of his receipts and disbursements for account of the Society during the past year ; and which annual account, duly audited, he shall present, with his general report, to the Society at its annual meeting.

#### CHAPTER XIV.

##### COUNCIL.

1. The Council shall have the management and control of the affairs, property, and funds of the Society, and shall designate an incorporated bank in the city of New York, where the said funds shall, from time to time as they accrue, be deposited by the treasurer.

2. It may frame its own by-laws, not inconsistent with the charter or by-laws of the Society.

3. It shall appoint the necessary agents, clerks, and servants of the Society, with such powers and duties, privileges and compensation as it may from time to time determine ; and may at pleasure revoke such appointments, and make others in their stead.

4. It shall have power to fill, for the unexpired term, any vacancy that may occur in any of the offices of the Society.

5. It shall have power, at its discretion, to declare vacant the seat of any member of its own body (except the president and vice-presidents) who shall have been absent from its meetings for three successive months ; and also by a vote of a majority of the whole Council to remove from its own body any member thereof for cause ; but in such case it shall be the duty of the Council to report every such vacancy or removal to the Society, at its next stated meeting thereafter, when such cases shall be subject to review by the Society.

6. It shall not, without an approving vote of the Society at a stated meeting thereof, make any contract whereby a liability in amount above one thousand dollars may be incurred by the Society • nor

without such vote make any sale or disposition of the property of the Society exceeding that sum in value.

7. The Council may, in its discretion, remit the initiation fee or annual dues of any member of the Society.

8. No member of the Council shall receive any salary or pecuniary compensation for his services.

9. The Council shall hold stated meetings for the transaction of business at least once in every month, except the months of July, August, and September.

10. At all meetings of the Council, five members present shall constitute a quorum for the transaction of business.

## CHAPTER XV.

### GENERAL PROVISION AS TO DEBT.

No debt on account of the Society, beyond the funds in the treasury for its payment, shall for any purpose, at any time, be incurred ; and if at any time it shall appear that there are resting upon the Society pecuniary obligations beyond the funds in the treasury for their liquidation, no appropriation of funds from the treasury whatever, except for the necessary current expenses of the Society, shall be made, until the said pecuniary obligation shall be fully discharged, or the funds necessary for their extinction shall have been set apart for that purpose.

## CHAPTER XVI.

### ALTERATION OF THE BY-LAWS.

No alteration in the by-laws of the Society shall be made unless openly proposed at a stated meeting of the Society, entered on the minutes, with the name of the member proposing the same, and adopted by the Society at a subsequent meeting, by a vote of two thirds of the members present.

## CHAPTER XVII.

### ADOPTION OF THE BY-LAWS.

The foregoing are hereby adopted and declared to be the by-laws of the Society ; and all by-laws of the Society heretofore adopted are hereby rescinded and declared to be null and void.



# HONORARY AND CORRESPONDING MEMBERS AND FELLOWS.

## HONORARY MEMBERS.

BAKER, Sir Samuel W., F.R.S., F.R.G.S.	retary of the Royal Geographical Society.
CONSTANTINE, the Grand Duke, President of the Imperial Russian Geographical Society, St. Petersburg.	McCLINTOCK, Admiral Sir F. L., R.N.
DUFFERIN and AVA, the Marquis of.	NARES, Rear-Admiral Sir George S., R.N., K.C.B.
ELDER, Sir Thomas, Adelaide, South Australia.	NORDENSKIÖLD, Baron A. E., Stockholm.
ISMAÏL, ex-Khedive of Egypt.	PEDRO II., ex-Emperor of Brazil.
LAYARD, Sir Austen Henry, D.C.L.	RAWLINSON, Major-General Sir Henry C., K.C.B., Vice-President of the Royal Geographical Society.
MARKHAM, Clements R., K.C.B., Sec-	

## CORRESPONDING MEMBERS.

ABBE, Prof. Cleveland, Washington.	MAUNOIR, Charles, Paris.
AMMEN, Rear-Admiral Daniel, U.S.N., Washington.	MAURY, Louis Ferdinand Alfred, Paris.
BARTHOLOMEW, John, Edinburgh.	MCCARTEE, D. Bethune, M.D., New York.
BREWER, Prof. Wm. H., New Haven.	NEGRI, Cristoforo, Turin.
BROWNEE, HARRISON, J., C. E., Manitoba.	NEY, Count Napoléon, Paris.
BALLANTINE, Henry, Bombay.	PACKARD, Prof. A. S., Providence, R.I.
BONAPARTE, Prince Roland, Paris.	PERALTA, Manuel M. de, Liege.
CHAIX, Prof. Paul, Geneva, Switzerland.	PRINCE, Hon. L. Bradford, Santa Fé, N. M.
CHAIX, Prof. Emile, Geneva, Switzerland.	PUMPELLY, Prof. Raphael.
DAVIDSON, Prof. Geo., U. S. Coast and Geodetic Survey, San Francisco.	RAE, John, M.D., London.
GARDNER, Prof. James T., Albany.	RAIMONDI, Antonio, Lima, Peru.
GILLIODTS VAN SEVEREN, L., LL.D., Bruges.	ROMERO, Matias, Envoy of Mexico at Washington.
GILMAN, Daniel C., LL.D., President Johns Hopkins University, Baltimore.	SCHUYLER, Hon. Eugene.
LECLERCQ, Jules, Brussels.	STANLEY, Henry M.
LESSEPS, Ferdinand de, Paris.	TACHÉ, E. E., Asst. Commissioner of Crown Lands, Quebec.
LONG, Col. C. Chaillé.	VINCENT, Frank.
LUCE, Admiral S. B., U.S.N.	VIVIEN DE SAINT-MARTIN, Versailles.
LUMHOLTZ, Carl, M. A., Christiania, Norway.	WALKER, Gen. Francis A., LL.D., Boston.
	WRIGHT, Gen. Horatio G., U.S.A., Washington.
	WYSE, Lt.-Com. Lucien N.B., Paris.
	WHITEHOUSE, F. Cope.



- |  |  |
|--|--|
| 1874 Bissinger, Philip.                                  | 1882 Ballin, Gustav N.                                 |
| 1874 Backus, Henry C. (L. F.)                            | 1882 Bacon, Francis McNeil.                            |
| 1874 Baldwin, Townsend B., (L. F.)<br>Tuxedo Park, N. Y. | 1882 Babcock, George H.                                |
| 1874 Barnes, John S.                                     | 1882 Barger, Samuel F. (L. F.)                         |
| 1874 Bonner, Robert.                                     | 1882 Barney, Newcomb C.                                |
| 1874 Benjamin, John.                                     | 1883 Barclay, J. Searle.                               |
| 1874 Butler, William Allen.                              | 1883 Brewster, Benj. (L. F.)                           |
| 1874 Barr, William.                                      | 1883 Bachem, C. H.                                     |
| 1874 Belding, Milo M.                                    | 1883 Baker, Cyrus O.                                   |
| 1874 Bookstaver, Hon. Henry W.                           | 1883 Beekman, Wm. B.                                   |
| 1874 Brownson, Commander W. H.,<br>U. S. N. (L. F.)      | 1883 Berry, Oliver F.                                  |
| 1875 Barney, Charles T.                                  | 1883 Bowne, Walter (L. F.)                             |
| 1875 Beaman, Charles C.                                  | 1883 Banta, Theodore M.                                |
| 1875 Bernheimer, J. A.                                   | 1883 Barr, Edward.                                     |
| 1875 Beckwith, Leonard F.                                | 1883 Bergen, Tunis G.                                  |
| 1875 Bedle, Hon. Jos. D.,<br>Jersey City, N. J.          | 1883 Battell, Robbins.                                 |
| 1875 Beekman, Gerard.                                    | 1883 Bennet, Ludovic.                                  |
| 1875 Brownell, Silas B.                                  | 1883 Blake, Frederick D.                               |
| 1875 Barnes, William.                                    | 1883 Bell, Capt. W. R.                                 |
| 1875 Beste, Henry.                                       | 1883 Benson, Frank Sherman.                            |
| 1875 Belknap, Rear Adm. Geo. E.,<br>U. S. N.             | 1884 Bentley, Henry. (L. F.)<br>Philadelphia, Pa.      |
| 1876 Brower, John.                                       | 1884 Burrall, F. A., M.D.                              |
| 1876 Billings, Frederick. (L. F.)                        | 1884 Barton, Geo. De F.                                |
| 1877 Bixby, Robert F. (L. F.)                            | 1884 Bangs, Fletcher H.                                |
| 1877 Blanchard, George R.                                | 1884 Bonner, G. T. (L. F.)                             |
| 1877 Blatchford, Eliphalet W.,<br>Chicago, Ill.          | 1884 Brookfield, William.                              |
| 1878 Bliss, Cornelius N. (L. F.)                         | 1884 Bassett, E. D.                                    |
| 1878 Barton, Oliver Grant. (L. F.)                       | 1885 Bliss, George T.                                  |
| 1878 Brown, Rev. Philip A. H.                            | 1885 Burnet, Robt., Cincinnati, O.                     |
| 1878 Brand, James.                                       | 1886 Barker, P. C., M.D., (L. F.)<br>Morristown, N. J. |
| 1878 Brown, J. Romaine.                                  | 1886 Benjamin, Hon. S. G. W.                           |
| 1879 Barattoni, C. A.                                    | 1886 Brown, Hon. Addison. (L. F.)                      |
| 1880 Banks, D. S. (L. F.)                                | 1886 Bridgman, E. C.                                   |
| 1881 Baldwin, Edwin. (L. F.)                             | 1886 Buckley, Rev. J. M., D.D.                         |
| 1881 Baldwin, Christopher C.                             | 1886 Bostwick, J. A. (L. F.)                           |
| 1881 Babcock, Samuel D.                                  | 1886 Blakeman, Birdseye.                               |
| 1881 Backus, Henry Landon,<br>Montclair Heights, N. J.   | 1886 Bowers, John M.                                   |
| 1882 Bamberger, Jacob F.                                 | 1886 Bruno, Richard M.                                 |
| 1882 Baldwin, Octavius D.                                | 1886 Bettens, Edward D.                                |
|  | 1886 Backus, J. Bayard.                                |
|  | 1886 Bouvier, M. C.                                    |
|  | 1886 Beddall, Edward F.                                |
|  | 1886 Berwind, Edward J.                                |

- 1886 Bliss, Alex., Washington, D. C.  
 1886 Bond, Frank S.  
 1886 Beattie, John.  
 1887 Brown, Robt. I. (L. F.)  
 1887 Boas, Dr. Franz.  
 1887 Blagden, George.  
 1887 Bigelow, Lucius H. (L. F.)  
 1887 Brown, Wm. C.  
 1887 Berrian, Charles M.  
 1887 Bradley, Leonard A. (L. F.)  
     New Haven, Conn.  
 1887 Booth, Fredk. A.  
 1887 Bentley, John.  
 1887 Braker, Conrad, Jr.  
 1887 Bend, George H.  
 1887 Belden, Josiah.  
 1887 Barbey, Henry I. (L. F.)  
 1887 Barron, John C., M.D. (L. F.)  
 1888 Bristow, Hon. Benj. H.  
 1888 Booker, Wm. Lane.  
 1888 Bogert, S. G.  
 1888 Berghaus, Dr. Alex.  
 1888 Buckham, George.  
 1888 Bruce, Sanders D.  
 1888 Bancroft, H. H., (L. F.)  
     San Francisco, Cal.  
 1888 Burgess, John W.  
 1888 Brown, Wm. Smith.  
 1888 Ballou, Maturin.  
 1888 Bieckinridge, Hon. Wm. C. P.,  
     Lexington, Ky.  
 1888 Baird, John.  
 1888 Bacon, Lathrop R.  
 1888 Bogert, Henry L.  
 1888 Heers, M. H.  
 1888 Barstow, J. Whitney, M.D.,  
     Flushing, N. Y.  
 1889 Blake, Francis, Weston, Mass.  
 1889 Benson, James H.  
 1889 Beyer, John A.  
 1889 Barnes, Thurlow Weed, Boston.  
 1889 Bromberg, Fredk. G.,  
     Mobile, Ala.  
 1889 Bentley, Norman S.  
 1889 Brimmer, Martin, Boston.
- 1889 Biddle, Edward R.  
 1889 Bigelow, Poultney. (L. F.)  
 1889 Baring, Thos.  
 1889 Bissell, Arthur F.  
 1889 Brown, Wm. Reynolds.  
 1889 Bowne, Robert.  
 1889 Baldwin, W. D.  
 1889 Bleything, Geo. Dacre, M D.  
 1889 Bidwell, Chas. E.  
 1889 Bidwell, D. H.  
 1889 Browning, J. H. Brower, M.D.  
 1889 Birdsall, W. R., M.D.  
 1889 Barnes, W. H., Philadelphia.  
 1890 Bliss, D. L. (L. F.),  
     Carson City, Nev.  
 1890 Benedict, Jas. H.  
 1890 Barnard, Jno. F., Cincinnati, O.  
 1890 Brooker, Chas. F.,  
     Torrington, Conn.  
 1890 Bertschmann, J., Swiss Consul.  
 1890 Bushnell, Jos.  
 1890 Bergen, Jas. C.  
 1890 Boyd, Jno. Scott. (L. F.)  
 1890 Brackenridge, G. W. (L. F.),  
     San Antonio, Tex.  
 1852 Colton, Joseph H. (L. F.)  
 1855 Conkling, Col. Fredk. A. (L. F.)  
 1856 Cooper, Hon. Edward.  
 1868 Catlin, N. W. Stuyvesant. (L. F.)  
 1868 Chapman, Joseph H.  
 1869 Cullum, Gen. George W.,  
     U. S. Army. (L. F.)  
 1870 Conklin, William A.  
 1872 Conklin, Edward E. (L. F.)  
 1872 Crawford, Gen. S. W., U. S. A.  
 1872 Clark, E. V.  
 1874 Campbell, Allan.  
 1874 Church, Col. George E. (L. F.)  
     London, Eng.  
 1874 Christern, F. W.  
 1874 Chickering, Charles F.  
 1874 Comstock, Cornelius.  
 1874 Constable, James M.  
 1874 Crocker, David.



- 1874 Crosby, Hon. J. Schuyler,  
Tuxedo Park, N. Y.
- 1874 Colgate, James B.
- 1874 Constantine, Andrew J.
- 1874 Conyngham, Wm. L. (L. F.)
- 1874 Crocker, Geo. A.
- 1874 Chickering, George H.,  
Boston, Mass.
- 1874 Carter, Oliver S., Orange, N. J.
- 1875 Clendenin, J. W.
- 1875 Cameron, Sir Roderick W. (L. F.)
- 1875 Cooper, George C. (L. F.)
- 1875 Chittenden, S. B.
- 1876 Curtis, Benj. L.
- 1879 Coddington, Gilbert S. (L. F.)
- 1879 Caldwell, R. A., M.D.
- 1879 Childs, George W.,  
Philadelphia, Pa.
- 1880 Calvin, Delano C.
- 1880 Cohen, Maurice S.
- 1881 Clinton, Henry L. (L. F.)
- 1882 Clarkson, Banyer.
- 1882 Coudert, F. R., LL.D.
- 1882 Conkling, Rev. N. W.
- 1883 Clarke, Thos. C.
- 1883 Chapman, Henry E. (L. F.)
- 1883 Chase, H. D.
- 1883 Clyde, W. P.
- 1883 Clews, Henry.
- 1883 Coit, George M.
- 1884 Claflin, John. (L. F.)
- 1884 Cook, John C.
- 1884 Carey, Henry T.
- 1884 Connor, W. E. (L. F.)
- 1884 Cummings, Geo. F.
- 1886 Cary, Alanson.
- 1886 Collyer, Rev. Robt., D.D.
- 1886 Conger, Clarence R.
- 1886 Crosby, Rev. Howard, D.D.
- 1886 Cooke, Henry C.
- 1886 Coffin, Edmund, Jr.
- 1886 Church, Benjamin S.
- 1886 Corthell, E. L., Chicago.
- 1886 Clarke, Stephen G.
- 1886 Carter, Henry C.
- 1886 Chace, Hon. Jonathan,  
Washington, D. C.
- 1886 Colvin, Verplanck, Albany, N. Y.
- 1886 Clarke, C. C.
- 1886 Calder, George.
- 1886 Camp, Hugh N.
- 1886 Chauncey, Elihu. (L. F.)
- 1887 Clark, Jefferson.
- 1887 Cheney, Alfred C.
- 1887 Comstock, Anthony.
- 1887 Cannon, H. W.
- 1887 Conover, A. E.
- 1887 Cranitch, Wm. I. A.
- 1887 Curtis, Geo. Wm.
- 1887 Compton, A. T.
- 1887 Cleveland, Clement, M.D.
- 1888 Colgate, Abner W.
- 1888 Crimmins, John D.
- 1888 Cotheal, Alex. I. (L. F.)
- 1888 Chase, George.
- 1888 Coutan, Adolphe R. (L. F.)
- 1888 Coutan, Chas. Albert. (L. F.)
- 1888 Clark, Alfred Corning. (L. F.)
- 1888 Cook, Henry H.
- 1888 Canda, Chas. J.
- 1888 Coleman, James S.
- 1888 Cross, Richard J.
- 1888 Coston, Wm. F.
- 1888 Chapin, Fred'k H.,  
Hartford, Conn.
- 1888 Chrystie, Wm. F.
- 1888 Chisholm, George E.
- 1888 Cochran, Wm. F. (L. F.)
- 1888 Clement, Percival W.
- 1889 Cox, Henry B. (L. F.)
- 1889 Conger, A. L., Akron, O.
- 1889 Clark, Chas. F.
- 1889 Cheever, John D.
- 1889 Crane, Chas. R., Chicago.
- 1889 Clausen, George C.
- 1889 Comstock, Geo. Carlton.
- 1889 Clark, Wm. Hancock.
- 1889 Cole, Eugene M.
- 1889 Carter, John J. (L. F.)  
Titusville, Pa.

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| 1890 Collett, Jos., Terre Haute, Ind.               | 1879 Dodge, George E.                            |
| 1890 Conklin, Roland R.                             | 1880 Deane, John H. (L. F.)                      |
| 1890 Carter, A., Jr.                                | 1880 Dyckman, Isaac M.,<br>Inwood, N. Y.         |
| 1890 Coles, Edwin S.                                | 1880 Du Bois, James G.                           |
| 1890 Cockcroft, Miss Mary T.                        | 1880 Du Bois, Frederick N.                       |
| 1890 Currier, Chas. G., M.D.                        | 1880 Dexter, Henry. (L. F.)                      |
| 1890 Carnrick, Jno.                                 | 1880 Deen, William M. (L. F.)                    |
| 1890 Clemens, Harold.                               | 1881 Davies, H. B.                               |
| 1890 Cleveland, Hon. Orestes,<br>Jersey City, N. J. | 1881 Docharty, Augustus T. (L. F.)               |
| 1890 Chambers, Hilary R.                            | 1882 Dunham, George H.                           |
| 1855 Daly, Charles P., LL.D. (L. F.)                | 1882 Dunlap, Robert. (L. F.)                     |
| 1856 Douglass, Andrew E.                            | 1883 Donnell, E. J. (L. F.)                      |
| 1856 Dodge, Wm. E.                                  | 1883 Decker, Jos. S.                             |
| 1856 Detmold, Wm., M.D.                             | 1884 Davis, Howland.                             |
| 1866 Darling, Hon. Wm. A.                           | 1884 Day, Henry.                                 |
| 1868 Dwight, Prof. Theo. W.                         | 1884 Donnelly, Thomas F.                         |
| 1868 Du Chaillu, Paul B.                            | 1884 Dodge, Richard J.                           |
| 1870 Davis, Alexander J. (L. F.),<br>Orange, N. J.  | 1884 Dalley, Henry, Jr.                          |
| 1871 Daly, Hon. Joseph F.                           | 1884 Douglass, Jas., Jr.                         |
| 1873 Delano, Franklin H. (L. F.)                    | 1885 Dupré, Ovide. (L. F.)                       |
| 1874 dePeyster, Gen. J. Watts. (L. F.)              | 1885 De Witt, George G., Jr.                     |
| 1874 Dutilh, Eugene.                                | 1886 Dix, Rev. Morgan, D.D.                      |
| 1874 Delafield, M. L.                               | 1886 de Lancey, Edward F.                        |
| 1874 Dana, Charles A.                               | 1886 Dayton, Chas. W.                            |
| 1874 del Monte, Leonardo,<br>Washington, D. C.      | 1887 Dickson, John.                              |
| 1874 Du Bois, Wm. A.                                | 1887 Day, Prof. Edward H.                        |
| 1874 Dalrymple, Alexander.                          | 1887 de Forest, George B.                        |
| 1874 Dunscombe, Richard T. (L. F.)                  | 1887 Davenport, W. F., M.D.                      |
| 1874 Dun, R. G.                                     | 1887 Dodman, Alfred C.                           |
| 1875 Darrow, William.                               | 1887 de Castro, Hector.                          |
| 1875 Davies, Julien T.                              | 1887 Donald, James M.                            |
| 1875 Du Bois, Eugene.                               | 1887 Doudge, James R. (L. F.)                    |
| 1875 Davison, Charles A.                            | 1888 Davidson, Prof. Thos.                       |
| 1875 de Peyster, Frederic J. (L. F.)                | 1888 Donnelly, Edward C.                         |
| 1875 Dommerich, L. F.                               | 1888 Dunham, James H.                            |
| 1877 Day, Henry M.                                  | 1888 Drexel, A. J., Philadelphia, Pa.            |
| 1877 Davis, Joseph Beale, (L. F.),<br>Orange, N. J. | 1888 Drexel, Mrs. Joseph W.                      |
| 1878 di Cesnola, Gen. L. P.                         | 1888 Davenport, Hon. Ira, (L. F.)<br>Bath, N. Y. |
| 1879 Dahlgren, Charles B.,<br>Trenton, N. J.        | 1888 Dana, Richard S.                            |
|   | 1888 Dyer, E. Tiffany.                           |
|   | 1888 Dimpfel, Fred'k P.                          |
|   | 1889 Day, Thomas.                                |
|   | 1889 De Zeller, John R.                          |

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| 1889 Denning, Edwin J.                 | 1883 Eyre, Maynard C.              |
| 1889 Dodd, S. C. T.                    | 1883 Earl, Wm. M.                  |
| 1889 Durkee, Eugene W.                 | 1885 Elmore, Hon. J. Federico,     |
| 1889 Davison, Henry J.                 | Washington, D. C.                  |
| 1889 Dwight, Jonathan, Jr.             | 1886 Easton, Robt. T. B. (L. F.)   |
| 1889 DuPont, H. A., Wilmington, Del.   | 1886 Ellis, Geo. W.                |
| 1889 Dickson, James B.                 | 1886 Edwards, Walter.              |
| 1889 Daley, Geo. H.                    | 1887 Ely, James R.                 |
| 1889 Deal, W. E. F., Virginia City,    | 1887 Eckert, Wm. H.                |
| Nev.                                   | 1887 Elkins, S. B.                 |
| 1889 Donald, Peter.                    | 1887 Eastman, Timothy C.           |
| 1889 de Goicouria, A. V.               | 1887 Egleston, Melville.           |
| 1889 Dexter, Julius, Cincinnati.       | 1888 Edgecomb, Daniel W.           |
| 1889 Dix, J. Augustus, Elizabeth, N.J. | 1888 Erben, Capt. Henry, U. S. N.  |
| 1890 Douglas, O. B., M.D.              | 1888 Edmunds, Hon. George F.,      |
| 1890 Davis, Hon. John,                 | Burlington, Vt.                    |
| Washington, D. C.                      | 1889 Eldridge, Edward, Whatcom,    |
| 1890 Dellinger, Chas. F.               | Wash.                              |
| 1890 Dulles, Wm., Jr.                  | 1889 Emmet, Wm. T., Pelham, N. Y.  |
| 1890 Davis, Robt. T., M.D.,            | 1889 Elliot, Mrs. M. Schuyler,     |
| Fall River, Mass.                      | Brooklyn.                          |
| 1890 Dinsmore, C. Gray. (L. F.)        | 1889 Ewing, Jay.                   |
| 1890 DuVivier, C. A.                   | 1890 Enos, Alanson T.              |
| 1859 Evarts, Hon. William M.           | 1854 Field, Cyrus W. (L. F.)       |
| 1868 Emmet, Thomas Addis, M.D.         | 1856 Field, Hon. David Dudley.     |
| 1874 Eaton, Prof. D. Cady,             | 1856 Field, B. H. (L. F.)          |
| New Haven, Conn.                       | 1857 Fish, Hon. Hamilton.          |
| 1875 Ellis, John W.                    | 1860 Field, Rev. H. M.             |
| 1875 Eimer, Charles.                   | 1864 Faile, Thomas H.              |
| 1875 Ely, Richard S.                   | 1871 Fliess, Wm. M.                |
| 1877 Elderkin, John.                   | 1873 Freedman, Hon. John J.        |
| 1878 Ellis, John, M.D.                 | 1874 Farragut, Loyall.             |
| 1879 Earle, Ferdinand P.               | 1874 Fellows, John P.              |
| 1879 Elliott, Samuel. (L. F.)          | 1874 Fleet, Oliver S.              |
| 1880 Eckert, Gen. Thomas T.            | 1874 Fox, Austen G. (L. F.)        |
| 1882 Easton, Nelson S.                 | 1875 Foulke, Rev. Thomas.          |
| 1882 Ellis, Wilbur Dixon.              | 1875 Fargo, James C.               |
| 1882 Eddy, Ulysses D.                  | 1875 Fuller, Charles D.            |
| 1882 Edwards, Hon. J. Pierrepont,      | 1875 Ford, James B.                |
| Bartow on the Sound, N. Y.             | 1875 Folsom, George W.             |
| 1882 Emerson, J. W. (L. F.)            | 1876 Fisk, Gen. Clinton B. (L. F.) |
| 1882 Emmons, John.                     | 1879 Fellows, John R.              |
| 1882 Earle, Joseph P. (L. F.)          | 1880 French, Hon. Stephen T.       |
| 1883 Eno, Amos F.                      | 1881 Fearing, William H.           |

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| 1882 Fairbanks, Leland.                | 1868 Gerry, Elbridge T. (L. F.)      |
| 1882 Fellows, Charles H.               | 1868 Greene, Andrew H.               |
| 1883 Fisher, Eustace W., M.D. (L. F.)  | 1869 Gilbert, Clinton.               |
| 1884 Fraser, Alfred.                   | 1872 Gerard, James W.                |
| 1885 Frank, Elias L.                   | 1872 Grinnell, R. M., (L. F.)        |
| 1886 Fitch, Chas. E., Rochester, N. Y. | Skaneateles, N. Y.                   |
| 1886 Flagler, H. M. (L. F.)            | 1873 Glaubenslee, Theo. G.           |
| 1886 Fiske, A. K.                      | 1874 Gunther, F. F.                  |
| 1886 Fettretch, Joseph.                | 1874 Gibbs, Theodore K. (L. F.)      |
| 1887 Foyé, Andrew J. C.                | 1874 Galpen, Horace.                 |
| 1887 Friedrichs, E. H.                 | 1877 Guleke, H. F., M.D.             |
| 1887 Fitzgerald, Louis.                | 1879 Graves, Arthur B. (L. F.)       |
| 1887 Fairfax, Hamilton R.              | 1879 Gay, Joseph E.                  |
| 1887 Floyd, John Gelston.              | 1881 Gallaway, R. M.                 |
| 1887 Fellows, Gordon.                  | 1881 Greene, George. (L. F.)         |
| 1888 Fish, Nicholas.                   | 1881 Grace, Hon. William R. (L. F.)  |
| 1888 Ferguson, Walton. (L. F.),        | 1881 Garland, James A.               |
| Stamford, Conn.                        | 1882 Gallup, Albert.                 |
| 1888 Ford, Hon. Melbourne H.,          | 1882 Gardiner, J. Grahame.           |
| Grand Rapids, Mich.                    | 1883 Greenough, John. (L. F.)        |
| 1889 Felton, Thos. Cary, Boston.       | 1883 Gottschalk, Felix.              |
| 1889 Frazer, Everett.                  | 1883 Goodridge, John C., Jr. (L. F.) |
| 1889 Fenton, David W. (L. F.)          | 1885 Glazier, Simon W.               |
| 1889 Freeland, Theodore H.             | 1885 Gibson, George R.               |
| 1889 Flint, Chas. R.                   | 1886 Gallatin, Frederic.             |
| 1889 Felton, S. M., Jr.                | 1886 Grummon, J. Ward,               |
| 1889 Freeman, Wm. C., Cornwall, Pa.    | Melrose Highlands, Mass.             |
| 1889 Fisher, Robt. C.                  | 1886 Georger, Louis F.               |
| 1889 Fitzpatrick, Chas. J.             | 1886 Gunther, W. H., Jr.             |
| 1889 Forman, Prof. Geo.,               | 1886 Gunther, Franklin L. (L. F.)    |
| Newark, N. J.                          | 1886 Gunther, Ernest Rudolph.        |
| 1890 Fairbanks, Franklin,              | 1886 Godwin, Parke.                  |
| St. Johnsbury, Vt.                     | 1886 Goodwin, James J. (L. F.)       |
| 1890 Fellowes, F. Wayland,             | 1886 Grant, James.                   |
| New Haven, Conn.                       | 1886 Godkin, E. L.                   |
| 1890 Ferrero, Gen. Leopoldo.           | 1887 Goodridge, Frederic.            |
| 1890 Fairchild, Hon. Chas. S.          | 1887 Grosvenor, Jas. B. M. (L. F.)   |
| 1890 Farnam, Henry W.,                 | 1887 Gould, George J.                |
| New Haven, Conn.                       | 1887 Gossler, Gustav H.              |
| 1890 Fearing, Daniel B. (L. F.),       | 1887 Griswold, John N. A.            |
| Newport, R. I.                         | 1888 Goodwin, C. Ridgely,            |
|  | Baltimore, Md.                       |
| 1856 Greenwood, Isaac J.               | 1888 Goodwin, Chas. S.               |
| 1857 Greene, John W., M.D. (L. F.)     | 1888 Greene, Byron W.                |
| 1868 Gebhard, Wm. H. (L. F.)           | 1888 Gard, Anson A.                  |

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| 1888 Grafton, Joseph.                  | 1875 Hyde, Henry B.                  |
| 1889 Gillis, Chas. J.                  | 1875 Harper, P. J. A.                |
| 1889 Grinnell, Geo. Bird.              | 1875 Harris, Sigmund.                |
| 1889 Gurnee, Augustus C.               | 1875 Hun, Leonard G., Albany, N. Y.  |
| 1889 Gardiner, Dr. Edward G.           | 1876 Holt, Henry.                    |
| 1889 Gage, E. B. (L. F.),              | 1876 Hoes, Wm. M.                    |
| Tombstone, Arizona.                    | 1876 Hatfield, J. B. T.              |
| 1889 Gourlie, Jno. H., Jr.             | 1878 Howe, George S.                 |
| 1889 Gilbert, G. K., Washington, D.C.  | 1878 Hinman, Wm. K.                  |
| 1889 Gargiulo, Joseph A.               | 1878 Hitchcock, Hiram. (L. F.)       |
| 1889 Gardiner, John L. (L. F), Boston. | 1879 Hamilton, Wm. G.                |
| 1889 Gest, Erasmus. (L. F),            | 1879 Harris, Col. Robert.            |
| Cincinnati, Ohio.                      | 1880 Hickox, Charles R.              |
| 1890 Goldthwaite, Wm. M.               | 1881 Hinman, Russell, Cincinnati, O. |
| 1890 Garden, Hugh R.                   | 1881 Hoffman, Charles B.             |
| 1890 Godfrey, Chas. H.                 | 1881 Hamilton, Robert Ray. (L. F.)   |
| 1890 Green, Caleb S. (L. F.),          | 1882 Hascall, Theodore F.            |
| Trenton, N. J.                         | 1882 Higginson, James J.             |
| 1890 Gardiner, John Lyon.              | 1883 Hotchkiss, Horace L.            |
| 1890 Graham, Robt. McCoskry.           | 1883 Hebert, Henry B.                |
|  | 1883 Howell, George R.               |
| 1856 Hewitt, Hon. Abram S.             | 1883 Hyde, E. Francis.               |
| 1856 Hunt, Wilson G.                   | 1883 Hurry, Edmund Abdy. (L. F.)     |
| 1859 Havemeyer, John C. (L. F.)        | 1883 Hoyt, Alfred M. (L. F.)         |
| 1864 Hammond, Henry B. (L. F.)         | 1883 Hendricks, Arthur T.            |
| 1868 Huntington, Daniel. (L. F.)       | 1885 Hubbard, Walter, Meriden, Ct.   |
| 1868 Hall, Elial F.                    | 1885 Homer, Chas. S., Jr.            |
| 1869 Hadden, John A. (L. F.)           | 1885 Henry, Edward L.                |
| 1870 Harrison, Prof. Thomas F.         | 1886 Hoe, Robert.                    |
| 1871 Hand, Clifford A.                 | 1886 Huidekoper, Arthur C.,          |
| 1872 Holbrook, Levi. (L. F.)           | Meadville, Pa.                       |
| 1873 Havemeyer, Hon. Theo. A.          | 1886 Henderson, Harold G.            |
| 1874 Hogue, Henry L.                   | 1886 Hoyt, Colgate.                  |
| 1874 Hurlbert, Henry A. (L. F.)        | 1886 Hoffman, Rev. Eugene A., D.D.   |
| 1874 Haydock, George G.                | 1886 Hawley, E. Judson.              |
| 1874 Haines, John P.                   | 1886 Hildreth, David M.              |
| 1874 Hinton, John H., M.D. (L. F.)     | 1886 Hinds, Joseph E.                |
| 1874 Holbrook, Edmund F.               | 1886 Hitchcock, Bradford W.          |
| 1874 Hendricks, Edmund.                | 1886 Hillhouse, Thomas G.            |
| 1874 Hendricks, Joshua.                | 1887 Hinchman, Walter.               |
| 1874 Hatch, Rufus.                     | 1887 Hastings, Prof. Thos. S., D.D.  |
| 1874 Huntington, C. P.                 | 1887 Huntington, Geo. S., M.D.       |
| 1874 Hunter, Maj. Edward, U. S. A.     | 1887 Hague, James D.                 |
| 1874 Hoyt, Harlow M.                   | 1887 Hurd, S. H., M.D.               |
| 1875 Houston, Col. D. C., U.S.A.       | Skaneateles, N. Y.                   |



- 1887 Hunker, Lieut. J. J., U.S.N.  
 1887 Horsford, Prof. E. N.,  
     Cambridge, Mass.  
 1887 Hopping, A. Howard.  
 1887 Hayes, Richard Somers.  
 1887 Howell, Theodore D.  
 1887 Hodgman, George F.  
 1887 Hill, James K.  
 1887 Hoadly, Hon. George.  
 1887 Holbrook, Edward.  
 1888 Henderson, John C.  
 1888 Hard, Anson W.  
 1888 Hoyt, Henry R.  
 1888 Hathaway, Horatio,  
     New Bedford, Mass.  
 1888 Hammond, Charles E.  
 1888 Hayward, James W.  
 1888 Higley, Hon. Warren.  
 1888 Harbeck, Chas. T., Islip, N. Y.  
 1889 Huntington, Chas. P. (L. F.)  
 1889 Hinrichs, C. F. A.  
 1889 Haynes, Prof. Henry W., Boston.  
 1889 Hastings, W., Wilmington, Del.  
 1889 Hurtt, Frank D. (L. F.)  
 1889 Harden, Hon. Wm. D.,  
     Savannah, Ga.  
 1889 Heilprin, Prof. Angelo,  
     Philadelphia.  
 1889 Hayden, Brace.  
 1889 Harper, Orlando M.  
 1889 Hazard, Rowland,  
     Providence, R. I.  
 1889 Hubbard, Gardiner G.,  
     Washington, D. C.  
 1889 Hamilton, Edmond Horace.  
 1889 Higbee, Rev. Chas.,  
     Pelham, N. Y.  
 1889 Hendrie, Wm. C.  
 1889 Hallidie, A. S., San Francisco.  
 1889 Hitchcock, Welcome G. (L. F.)  
 1889 Hogg, T., Egerton.  
 1889 Henderson, Norman.  
 1889 Holloway, Josephus F.  
 1889 Hoagland, C. N., M.D., (L. F.)  
     Brooklyn.  
 1889 Hardee, John L., Savannah, Ga.  
 1889 Harrower, H. D.  
 1889 Howells, Henry C.  
 1889 Hain, Frank K.  
 1889 Halsted, James M.  
 1889 Harper, Edward B.  
 1889 Henley, Wm. I.  
 1889 Harriot, Samuel C. (L. F.)  
 1889 Hackstaff, Alexander G.  
 1890 Hill, James J., St. Paul, Minn.  
 1890 Harriman, J. Arden.  
 1890 Hough, Stockton.  
 1890 Husted, Seymour L., Jr.  
 1859 Ireland, John B.  
 1874 Iselin, Adrian, Jr.  
 1881 Ives, Brayton. (L. F.)  
 1883 Ives, James M.  
 1886 Irving, John Treat.  
 1887 Isham, Charles. (L. F.)  
 1887 Inslee, Samuel.  
 1887 Ivison, David B. (L. F.)  
 1888 Irving, Cortlandt.  
 1889 Ickelheimer, Isaac.  
 1890 Irving, Walter.  
 1852 Jay, Hon. John. (L. F.)  
 1852 Jones, John D. (L. F.)  
 1871 Jones, Walter R. T.  
 1874 Judson, Wm. D.  
 1874 Jesup, M. K. (L. F.)  
 1874 Jaffray, Edward S.  
 1874 Jenkins, Wm. L.  
 1874 James, D. Willis.  
 1874 Jameson, Joseph A.  
 1874 Jaffray, Robert.  
 1879 Jay, William.  
 1880 Jewett, George L.  
 1881 Jewett, Hugh J., Glenville, Md.  
 1881 Johnson, Bradish, Jr.  
 1882 Jasper, John.  
 1883 Judson, A. M.  
 1885 Juilliard, A. D.  
 1886 Janeway, Henry L.,  
     New Brunswick, N. J.

- 1886 Jacobi, A., M.D.  
 1886 Jennings, O. B.  
 1886 Jackson, Rev. Samuel M.  
 1886 Janvrin, J. E., M.D.  
 1887 Jenkins, Augustus S.  
 1888 Jones, Oliver L. (L. F.)  
 1888 Jackson, Oswald.  
 1888 Johnson, George F.  
 1889 Jayne, Frank A.  
 1889 James Geo. Abbot, Boston.  
 1890 James, Walter B., M.D.  
 1890 Johnes, Edward R.  
 1890 Janin, Henry.  
 1890 Jones, Geo. A.  
 1869 Kelly, Eugene.  
 1870 Kühne, Frederick.  
 1872 Kendrick, Col. H. L., U.S.A.  
 1873 Kennan, George, (L. F.)  
     Washington, D. C.  
 1874 King, Edward.  
 1874 Kearny, Joseph R.  
 1874 Kunhardt, Henry R.  
 1874 Kingsland, Wm. M. (L. F.)  
 1874 Kalbfleisch, Charles H.  
 1874 Keck, Thomas.  
 1876 Knauth, Percival. (L. F.)  
 1877 King, Clarence. (L. F.)  
 1878 Kernochan, Jas. Lorillard. (L. F.)  
 1879 Kane, S. Nicholson.  
 1880 Keene, James R. (L. F.)  
 1881 Kennedy, John S. (L. F.)  
 1881 Kane, Grenville. (L. F.)  
 1881 Kirsch, Louis, Brooklyn, N. Y.  
 1882 King, Le Roy.  
 1882 King, George Gordon,  
     Newport, R. I.  
 1882 King, Vincent C. (L. F.)  
 1883 Kneeland, Hefry T.  
 1883 Knapp, S. P.  
 1883 Kohn, Julius A.  
 1883 Kerr, Walter.  
 1883 King, D. H., Jr.  
 1884 Kountze, Augustus. (L. F.)  
 1884 Kahn, Dr. Herman.  
 1885 Keane, Joseph.  
 1885 Keppler, Rudolph. (L. F.)  
 1886 Kurtz, William.  
 1886 Kendall, Edward H.  
 1886 Kidder, Camillus G. (L. F.)  
 1886 Karner, W. J., Chicago, Ill.  
 1887 Knight, George T. (L. F.)  
 1887 Kevan, William.  
 1887 Knox, John Jay.  
 1888 Kelly, Edward. (L. F.)  
 1888 Kissel, Gustav E.  
 1888 Knox, Herbert H.  
 1888 Kellogg, Charles, Athens, Pa.  
 1888 Kennedy, H. Van Rensselaer.  
 1889 Kaufmann, S. H.,  
     Washington, D. C.  
 1889 Koch, Peter, Bozeman, Montana.  
 1889 Keogh, Martin J., Pelham, N. Y.  
 1889 Kimber, Henry, M. P., London.  
 1889 Kimball, F. J., (L. F.)  
     Philadelphia.  
 1889 Kobbe, Walter.  
 1852 Livingston, Cambridge. (L. F.)  
 1857 Low, Abiel A. (L. F.)  
 1859 Lathers, Richard. (L. F.)  
 1869 Lawrence, John S. (L. F.)  
 1870 Loew, Hon. Frederick W.  
 1870 Lyman, Edward H. R.  
 1871 Letson, Robert S.  
 1871 Larremore, Richard L., LL.D.  
 1872 Libbey, William. (L. F.)  
 1874 Lauterbach, Edward.  
 1874 Livingston, Robert J. (L. F.)  
 1874 Langdon, Walter, (L. F.)  
     Hyde Park, N. Y.  
 1874 Lorillard, Pierre, (L. F.)  
 1874 Littlejohn, James,  
     Brooklyn, N. Y.  
 1874 Le Comte, Joseph.  
 1874 Lawson, Leonidas M.  
 1874 Leshner, Stephen R.  
 1875 Low, Hon. Seth. (L. F.)  
 1875 Lawrence, George N.  
 1876 Low, A. Augustus. (L. F.)

- 1878 Loubat, J. F., LL.D. (L. F.)  
 1878 Leon, Néstor Ponce de.  
 1879 Levy, Augustus H.  
 1880 Lang, Alexander.  
 1880 Lee, William H.  
 1881 Libbey, Prof. William, Jr., (L. F.)  
     Princeton, N. J.  
 1881 Langdon, Woodbury G. (L. F.)  
 1881 Little, Joseph J. (L. F.)  
 1881 Livermore, Edwin R.  
 1882 Lambert, Edward.  
 1882 Langdon, Woodbury.  
 1882 Lamont, Lansing.  
 1882 Lapham, Lewis H.  
 1882 Lamborn, Robert H.  
 1883 Lourie, J.  
 1883 Lummis, William.  
 1883 Lounsbery, R. P.  
 1886 Leete, C. H.  
 1886 Ludington, C. H. (L. F.)  
 1886 Lee, Wm. H. L.  
 1887 Lord, Daniel, Jr.  
 1887 Littleheld, Frederick M.  
 1887 Langmann, G., M.D.  
 1887 Lewis, James F.  
 1887 Lester, Henry M.  
 1887 Logan, Walter S.  
 1887 Lodge, Hon. Henry Cabot,  
     Boston, Mass.  
 1887 Lovell, John W.  
 1887 Loomis, Alfred L., M.D.  
 1887 Lee, Homer.  
 1888 Lespinasse, George S.  
 1888 Lancaster, R. A.  
 1888 Lynch, James D. (L. F.)  
 1888 Lawton, James M. (L. F.)  
 1888 Lawson, James.  
 1889 Lewis, Richard V.  
 1889 Lovell, Frank H., Brooklyn.  
 1889 Law, Walter W.  
 1889 Lydig, David.  
 1889 Lowthian, Thos., Denver, Colo.  
 1889 Lagrave, John J.  
 1889 Le Roy, Edward A.  
 1889 Lockman, Jacob K.  
 1890 Loth, Joseph. (L. F.)  
 1890 Lamberton, Chas. L.  
 1853 Moore, George H. (L. F.)  
 1856 Monroe, Ebenezer, Southport, Ct.  
 1859 MacMullen, Prof. John.  
 1859 Morrell, Wm. H. (L. F.)  
 1859 Moore, Frank. (L. F.)  
 1863 Moore, W. H. H. (L. F.)  
 1864 Morton, Hon. Levi P. (L. F.)  
 1868 Morrison, Henry.  
 1868 Martin, Isaac P.  
 1868 Marquand, Henry G. (L. F.)  
 1870 Marbury, Francis F.  
 1872 Meyer, F. William.  
 1872 Marié, Peter. (L. F.)  
 1873 Moore, C. B.  
 1874 Morris, Henry L. (L. F.)  
 1874 Marble, Manton.  
 1874 Morgan, W. F.  
 1874 Moir, James.  
 1874 Morgan, J. Pierpont. (L. F.)  
 1874 McAlpine, David H.  
 1874 Merrall, William J. (L. F.)  
 1874 Moulton, Clarence F.  
 1875 Mitchell, Edward.  
 1875 Macy, Arthur.  
 1875 Marcus, Arnold.  
 1875 Magoun, George C.  
 1875 Maclay, Moses B.  
 1875 Martin, Bradley. (L. F.)  
 1875 Meyer, L. H.  
 1875 McLanahan, Geo. William.  
 1876 Mitchell, W. Howard.  
 1877 Matsell, Geo. W.,  
     Anamosa, Iowa.  
 1878 Musgrave, Thomas B. (L. F.)  
 1878 Mason, Lieut. T. B. M.,  
     U.S.N. (L. F.)  
 1879 Marshall, William I., Chicago, Ill.  
 1879 Mather, Frederick E.  
 1879 Motz, Ferdinand.  
 1879 Miller, John Bleecker.  
 1879 Monteith, James.  
 1880 Mills, D. O. (L. F.)

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|---|---|
| 1880 Massey, Wm. M.                                   | 1888 Myers, Theodore W.                                     |
| 1882 Marquand, John P.                                | 1888 Milhau, Gen. John J. (L. F.)                           |
| 1882 Marsh, Caleb P.                                  | 1888 Mather, Samuel, Cleveland, O.                          |
| 1882 McWilliam, John.                                 | 1888 Mead, Edwin, Jr.                                       |
| 1882 Moore, W. T.                                     | 1888 McGill, Geo. W.,<br>Riverdale-on-Hudson, N. Y.         |
| 1882 Mead, Erastus F.                                 | 1888 Moore, Cary W.   |
| 1882 Markoe, F. H., M. D. (L. F.)                     | 1888 Martin, Oswald J. (L. F.)                              |
| 1883 Mackay, Donald. (L. F.)                          | 1888 McGee, James, Plainfield, N. J.                        |
| 1883 McCreery, James. (L. F.)                         | 1888 McKeever, J. Lawrence.                                 |
| 1883 Morgan, E. D.                                    | 1889 Martin, Rob't C.                                       |
| 1883 Mali, Charles.                                   | 1889 McCormick, Hon. R. C.,<br>Jamaica, N. Y.               |
| 1884 Moore, Joseph, Jr., (L. F.)<br>Philadelphia, Pa. | 1889 Marsland, Dr. Geo.                                     |
| 1884 Meyers, Andrew G.                                | 1889 Mead, Edwin, H.  |
| 1884 MacKellar, Wm. (L. F.)                           | 1889 McFarland, Wm. W.                                      |
| 1885 Mackenzie, D. E.                                 | 1889 McBryde, J. M., Columbia, S. C.                        |
| 1885 Morison, George S., (L. F.)<br>Chicago.          | 1889 Mayes, Edward, University,<br>Miss.                    |
| 1886 Muñoz, J. M. (L. F.)                             | 1889 Milliken, James, Bellefonte, Pa.                       |
| 1886 Murray, James B.                                 | 1889 Maitland, Alexander. (L. F.)                           |
| 1886 Moore, John G.                                   | 1889 Macdonough, James.                                     |
| 1886 Moses, Raphael J., Jr.                           | 1889 Mortimer, W. Y.  |
| 1886 Macklin, John J.                                 | 1889 Morgan, Wm. H.   |
| 1886 Morgan, N. Denison.                              | 1889 Marié, Léon.   |
| 1886 MacFarland, James,                               | 1890 Mallory, S. H., Chariton, Iowa.                        |
| 1887 Morgan, Wm. Fellowes. (L. F.)                    | 1890 Mackey, Chas. W.,<br>Franklin, Pa.                     |
| 1887 Malcolm, William L.                              | 1890 Montant, Alphonse.                                     |
| 1887 Mitchell, Hubbard W., M.D.                       | 1890 Marvin, Chas. M.                                       |
| 1887 Metcalfe, John T., M.D.                          | 1890 Martin, Chas., M. D.                                   |
| 1887 Macy, Isaac A.                                   | 1890 McCarter, Hon. Thos. N.,<br>Newark, N. J.              |
| 1887 McCourt, P. J., M.D.                             |   |
| 1887 Mack, Jacob W.                                   |   |
| 1887 Mali, Henry W. T.                                |   |
| 1887 Meyer, Alfred, M.D.                              |   |
| 1887 Moulton, Franklin W.                             | 1874 Newell, John (L. F.), Chicago, Ill.                    |
| 1887 Montgomery, Warwick E.                           | 1874 Niles, William W.                                      |
| 1887 McCready, N. L.                                  | 1880 Nelson, William.                                       |
| 1887 Morton, Alexander L.                             | 1882 Nisbet, John L., Yonkers, N. Y.                        |
| 1888 Marquand, Henry. (L. F.)                         | 1882 Naylor, Joseph.  |
| 1888 Morgan, Rev. D. Parker.                          | 1882 Nelson, Richard.                                       |
| 1888 Mason, Alex. T. (L. F.)                          | 1883 Noble, Charles C., (L. F.)<br>Narragansett Pier, R. I. |
| 1888 Malcolm, Chas. E.                                |   |
| 1888 Moss, Mrs. J. Osborne,<br>Sandusky, O.           | 1884 Neumoegeen, B.   |
| 1888 Mayo, Dr. Wm. Starbuck.                          | 1884 Newberry, Dr. John S.                                  |
|   | 1885 Nelson, Rev. George Francis.                           |

- 1886 Neilson, James,  
                     New Brunswick, N. J.  
 1886 Notman, John.  
 1886 Neftel, W. B., M.D. (L. F.)  
 1887 Neels, John N.  
 1887 Noyes, Wm. C.  
 1889 Nunn, R. J., M.D.,  
                     Savannah, Ga.  
 1889 Newton, Daniel H.,  
                     Holyoke, Mass.  
 1890 Nelson, Wm. S.  
 1890 Newton, John.  
  
 1874 Ottendorfer, Oswald. (L. F.)  
 1874 Olyphant, Robert M.  
 1874 Owen, Frederick N.  
 1875 Otterbourg, Hon. Marcus.  
 1875 Ottiwell, John D.  
 1875 O'Connor, Thomas H. (L. F.)  
 1875 Opdyke, William S. (L. F.)  
 1877 O'Gorman, Hon. Richard.  
 1879 O'Gorman, Richard, Jr.  
 1879 O'Brien, Thomas S. (L. F.)  
 1880 O'Shaughnessy, John W. (L. F.)  
 1881 Oakley, Henry A.  
 1882 Osborn, W. H. (L. F.)  
 1882 Oppenheim, Edward L.  
 1882 Osgood, William H.  
 1883 O'Donohue, Jos. J.  
 1886 O'Brien, Hon. Morgan J.  
 1887 Oldham, J. Leslie.  
 1887 Ogden, William B. (L. F.)  
 1888 Oakes, T. F., (L. F.)  
                     St. Paul, Minn.  
 1889 Openhym, Wm.  
 1889 O'Connor, Wm. P.  
 1889 Orr, Alexander E.  
 1890 Olcott, Frank Nelson.  
 1890 O'Dwyer, J., M.D.  
 1890 Oppenheim, B. Gerson.  
  
 1852 Poor, Henry V. (L. F.)  
 1855 Pierrepont, Hon. Edwards.  
 1857 Pyne, Percy R. (L. F.)  
 1868 Powers, William P.  
  
 1868 Paulison, John P., Tenafly, N. J.  
 1871 Peabody, Hon. Chas. A.  
 1872 Parish, Henry. (L. F.)  
 1874 Peabody, Arthur J.  
 1874 Penfold, William Hall.  
 1874 Potter, Hon. Orlando B.  
 1874 Pondir, John.  
 1874 Porter, John K.  
 1874 Packer, Elisha A.  
 1874 Powers, George J.  
 1874 Prichard, William M.  
 1875 Prentice, W. P.  
 1875 Pfund, Anton.  
 1875 Porter, Gen. Horace.  
 1876 Plum, James R.  
 1878 Parsons, Edwin.  
 1880 Pinchot, James W.  
 1880 Powell, Wilson M.  
 1881 Post, Charles A.  
 1882 Parsons, Wm. (L. F.)  
 1882 Parrish, James C. (L. F.)  
 1882 Pell, Wm. Cruger,  
                     Highland Falls, N. Y.  
 1882 Parsons, Joseph H.  
 1882 Paton, John.  
 1882 Platt, Thos. C.  
 1882 Parsons, John E.  
 1882 Parsons, Charles.  
 1882 Peck, Charles M.  
 1882 Parsons, Mrs. E. (L. F.)  
 1883 Parks, Robert H. (L. F.)  
 1884 Post, George B.  
 1884 Place, George.  
 1884 Purdy, John F.  
 1884 Plush, Dr. Samuel M., (L. F.)  
                     ( Philadelphia, Pa.  
 1885 Post, Wm. Henry. (L. F.)  
 1885 Parker, George A.  
 1885 Plantén, J. R. (L. F.)  
 1885 Pell, Charles E.  
 1886 Phoenix, Phillips. (L. F.)  
 1886 Pearsall, T. W.  
 1886 Pryer, Chas., New Rochelle, N. Y.  
 1886 Parris, Edward L.  
 1887 Phoenix, Lloyd. (L. F.)



- 1887 Perdicaris, Ion.  
 1887 Peaslee, Wyllys G.,  
                     Dubuque, Iowa.  
 1887 Peters, George A., M.D.  
 1887 Parsons, Wm. H.  
 1887 Putney, Daniel.  
 1887 Pearson, Frederick.  
 1887 Peters, Samuel T.  
 1887 Parsell, Henry V.  
 1888 Post, H. A. V.  
 1888 Peabody, Joseph, Boston, Mass.  
 1888 Perry, William A.  
 1888 Paine, Robert Treat,  
                     Boston, Mass.  
 1888 Phillips, Wm. D.  
 1888 Prescott, Geo. B.  
 1888 Paddock, Hon. A. S.,  
                     Beatrice, Neb.  
 1889 Pickering, Prof. Ed. C.,  
                     Cambridge, Mass.  
 1889 Prince, Fred'k O., Boston, Mass.  
 1889 Palmer, S. S.  
 1889 Peabody, John E., Boston, Mass.  
 1889 Peck, Charles E.  
 1889 Phillips, Frederic D.  
 1889 Putnam, Geo. L.  
 1889 Pell, Walden.  
 1889 Prince, Col. W. E., U.S.A.  
 1889 Peabody, Francis H.,  
                     Boston, Mass.  
 1889 Pirsson, J. W.  
 1889 Palmer, Wm. J.  
 1890 Perkins, W. H.  
 1890 Purse, D. G., Savannah, Ga.  
 1890 Plumb, Edward L. (L. F.)  
 1890 Price, J. Sergeant, Philadelphia.  
 1890 Porter, Gen. Fitz John.  
 1890 Potter, Edward Clarkson.  
 1890 Porter, George E.  
 1890 Palmer, Dr. H. R.  
 1890 Peabody, S. Endicott, Boston.  
 1890 Potter, Geo. F.  
 1883 Quackenbos, John D., M.D.  
 1883 Quinlan, Leonard G.  
 1854 Rutherford, L. M., LL. D.  
 1856 Randolph, Anson D. F.  
 1856 Remsen, William. (L. F.)  
 1856 Riker, John H.  
 1861 Rogers, C. B. (L. F.)  
 1868 Raven, Anton A. (L. F.)  
 1868 Rose, Cornelius.  
 1872 Robbins, Chandler. (L. F.)  
 1874 Reid, Whitelaw.  
 1874 Richard, Auguste. (L. F.)  
 1874 Rogers, H. Livingston.  
 1874 Riker, William J.  
 1874 Reynes, Jaime.  
 1874 Rhoades, John H.  
 1875 Roosevelt, Clinton.  
 1875 Read, Gen. Meredith., (L. F.)  
                     Paris.  
 1876 Ross, William B.  
 1878 Roorbach, Orville A. (L. F.)  
 1878 Rainey, Thomas, M.D.,  
                     Ravenswood, N. Y.  
 1879 Rhinelander, Miss J. (L. F.)  
 1880 Robinson, Mrs. John A. (L. F.)  
 1881 Robbins, George A.  
 1881 Rhinelander, Frederick W.  
 1882 Rinehart, E.  
 1882 Ray, James D.  
 1882 Robbins, S. H.  
 1882 Redding, W. E.  
 1882 Rolston, Roswell G.  
 1882 Rhinelander, Charles E.  
 1882 Rathborne, C. L.  
 1883 Rosenbaum, Albert S.  
 1883 Richardson, Briton.  
 1883 Rowland, Thomas F. (L. F.)  
 1886 Raymond, R. W. (L. F.)  
 1886 Roys, Geo. B.  
 1886 Rice, Isaac L. (L. F.)  
 1886 Ransom, Rastus S.  
 1887 Remsen, Robert Geo. (L. F.)  
 1887 Ruggles, James Francis.  
 1887 Robertson, R. H.  
 1887 Robb, Hon. J. Hampden. (L. F.)  
 1887 Rowell, Geo. P. (L. F.)  
 1887 Rogers, Archibald. (L. F.)

- 1887 Rice, Henry.  
 1887 Robertson, T. S., M.D.  
 1888 Russell, Henry E.  
 1888 Riker, Daniel S.  
 1888 Roe, Alfred.  
 1888 Ropes, Chas. H.  
 1888 Rhinelander, Wm.  
 1888 Renwick, Edward S.  
 1888 Richter, Dr. C. M.,  
     San Francisco, Cal.  
 1888 Russell, Hon. John E.,  
     Leicester, Mass.  
 1888 Robinson, Wm. M.  
 1888 Reiley, Robt. T.  
 1889 Ropes, John C., Boston, Mass.  
 1889 Rice, Prof. J. M., Annapolis, Md.  
 1889 Robert, Fred'k.  
 1889 Russell, Samuel H., Boston, Mass.  
 1889 Rowe, Wm. H.,  
     Salt Lake City, Utah.  
 1889 Roelker, Alfred. (L. F.)  
 1889 Reynolds, Clinton G.  
 1889 Ross, W. A.  
 1889 Renauld, Charles.  
 1889 Roberts, Rev. Wm. C.,  
     Lake Forest, Ill.  
 1889 Reed, J. Van D. (L. F.)  
 1889 Ribon, Juan G., Jersey City, N.J.  
 1889 Rogers, N. Pendleton.  
 1889 Ryan, Thos. F.  
 1890 Roe, Chas. F., U. S. A.  
 1890 Reich, Lorenz.  
 1890 Raymond, Chas. H.  
 1890 Rea, Geo. Bronson.  
 1890 Roberts, A. Cookman.  
  
 1856 Spofford, Paul N.  
 1856 Schermerhorn, Wm. C.  
 1856 Sherman, W. Watts.  
 1859 Schultz, John H. (L. F.)  
 1860 Stout, Francis A. (L. F.)  
 1869 Strebeigh, Robert M.  
 1870 Sherwood, John.  
 1870 Schafer, Samuel M. (L. F.)  
 1870 Schafer, Simon. (L. F.)  
  
 1870 Seligman, James.  
 1870 Seligman, Jesse.  
 1871 Shaler, Gen. Alexander,  
     Ridgefield, N. J.  
 1871 Swan, William H.  
 1872 Steiger, E.  
 1872 Stuyvesant, Rutherford. (L. F.)  
 1873 Sturges, Frederick.  
 1873 Spencer, James C.  
 1873 Scott, Julian, (L. F.)  
     Plainfield, N. J.  
 1873 Southworth, Alvan S. (L. F.)  
 1873 Sturgis, Frank K. (L. F.)  
 1874 Sands, Harry M.  
 1874 Steinway, William.  
 1874 Sloan, Samuel.  
 1874 Schermerhorn, F. Augustus. (L. F.)  
 1874 Stuyvesant, Robert R.  
 1874 Strong, W. L. (L. F.)  
 1874 Steward, D. Jackson.  
 1874 Shethar, Samuel.  
 1874 Schieffelin, Samuel B.  
 1874 Stilwell, Benjamin M.  
 1874 Sawyer, Warren, Boston, Mass.  
 1874 Sands, Andrew H.  
 1874 Schaus, William.  
 1874 Spinney, Joseph S.  
 1874 Striker, J. A.  
 1875 Stanford, William H.  
 1875 Smith, Lewis Bayard.  
 1875 Sturges, Henry C.  
 1875 Stewart, Col. Charles Seaforth,  
     Cooperstown, N. Y.  
 1875 Schultz, Carl H.  
 1875 Sanford, Elliott. (L. F.)  
 1875 Stranahan, J. S. T.  
     Brooklyn, N. Y.  
 1875 Schiff, Jacob H. (L. F.)  
 1875 Smith, Augustine.  
 1876 Smith, Harsen H.  
 1876 Sibley, Hiram W., (L. F.)  
     Rochester, N. Y.  
 1876 Spaulding, Henry F.  
 1876 Stryker, Gen. William S.,  
     Trenton, N. J.

- 1876 Stone, Andros B.  
 1877 Shearman, William P. (L. F.)  
 1877 Sanford, Gen. Henry S.,  
     Birmingham, Ct.  
 1877 Sanger, Major Joseph P., U.S.A.  
 1877 Schaff, Rev. Philip, D.D.  
 1877 Schuyler, Philip.  
 1878 Stewart, William Rhinelander.  
 1878 Sands, William R. (L. F.)  
 1878 Smith, S. Newton.  
 1878 Sabla, Theodore de Joly de.  
 1879 Stevens, Frederic W. (L. F.)  
 1879 Smith, E. Reuel. (L. F.)  
 1879 Smith, Herbert H.,  
     Brooklyn, N. Y.  
 1879 Shields, Prof. Charles W.,  
     Princeton, N. J.  
 1879 Stetson, Francis Lynde.  
 1880 Southwick, Henry K. (L. F.)  
 1882 Sass, Dr. Luis F.  
 1882 Schuyler, Spencer D. (L. F.)  
 1882 Sayre, Lewis A., M.D. (L. F.)  
 1882 Scott, George S.  
 1882 Skidmore, Wm. L.  
 1882 St. John, W. P.  
 1882 Scribner, Charles.  
 1883 Schermerhorn, Charles A.  
 1883 Simpson, George E.  
 1883 Stone, Sumner R.  
 1883 Sinclair, John. (L. F.)  
 1883 Spence, Lewis H.  
 1883 Smith, William Alex.  
 1883 Smith, Henry N., (L. F.)  
     Trenton, N. J.  
 1883 Stern, Louis.  
 1883 Sanger, Wm. Cary.  
 1883 Scott, Rufus L.  
 1883 Sorzano, Julio F.  
 1883 Spicer, Elihu, Jr. (L. F.)  
 1884 Schley, J. Montfort, M.D.  
 1884 Shannon, Robert H.  
 1884 Stokes, James.  
 1885 Storer, Albert.  
 1885 Sturgis, Russell.  
 1885 Stanton, S. Franklin.  
 1885 Storm, Walton.  
 1885 Schmelzel, Wm. R.  
 1886 Stevens, Rev. C. Ellis.  
 1886 Sherman, Prof. O. T.,  
     Cambridge, Mass.  
 1886 Sherman, George. (L. F.)  
 1886 Schuyler, Geo. L.  
 1886 Starr, Egbert.  
 1886 Satterlee, F. Le Roy, M.D.  
 1886 Sturgis, F. R., M.D.  
 1886 Smith, Edwin B.  
 1886 Snead, Thomas L.  
 1887 Stewart, Lisenard.  
 1887 Sutton, Rev. J. Ford, D.D.  
 1887 Schell, Robert.  
 1887 Swain, George F., Passaic, N. J.  
 1887 Sawyer, Lieut. J. Estcourt, U.S.A.  
 1887 Seligman, Dewitt J.  
 1887 Smith, Jas. Rufus.  
 1887 Smith, Nathaniel S.  
 1887 Sellew, T. G.  
 1887 Satterthwaite, Thos. E., M.D.  
 1887 Stetson, George W. (L. F.)  
 1887 Satterlee, S. K., Rye, N. Y.  
 1887 Sterry, George E.  
 1887 Shortall, John G., Chicago, Ill.  
 1887 Serrell, Gen. Edward W.  
 1887 Stickney, Austin.  
 1887 Stevens, George T.  
 1888 Stephens, Benjamin.  
 1888 Stickney, Albert.  
 1888 Stuart, Inglis.  
 1888 Smith, Nelson.  
 1888 Sprague, Henry E.  
 1888 Salisbury, Stephen, (L. F.)  
     Worcester, Mass.  
 1888 Smith, A. Cary.  
 1888 Stott, Frank H., (L. F.)  
     Stottville, N. Y.  
 1888 Starbuck, Wm. H.  
 1888 Smythe, Rev. Hugh,  
     S. Orange, N. J.  
 1888 Sheldon, Edwin B., Chicago, Ill.  
 1888 Schell, Edward.  
 1888 Skiddy, Wm. W., Stamford, Conn.



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| 1889 Taylor, Franklin E.                                 | 1887 Van Slyck, Geo. W. (L. F.)                  |
| 1889 Tuckerman, Joseph, Newport,<br>R. I.                | 1887 Voorhees, Philip R.                         |
| 1889 Topping, Henry S.                                   | 1888 Villard, Henry.                             |
| 1889 Teft, F. Griswold.                                  | 1888 Ver Planck, Wm. G.                          |
| 1889 Townsend, Alfred M.                                 | 1888 Vail, Theodore N.                           |
| 1889 Tuck, Somerville P.                                 | 1889 Vanderbilt, Geo. W. (L. F.)                 |
| 1889 Thompson, Rob't M.                                  | 1889 Van Devanter, Willis,<br>Cheyenne, Wyoming. |
| 1889 Tatham, Chas.                                       | 1890 Valentine, Ferdinand C., M.D.               |
| 1889 Thaw, Wm., Jr., Allegheny, Pa.                      | 1890 Vose, Geo. H.                               |
| 1889 Throop, Enos T.                                     |  |
| 1889 Trask, Chas. H.                                     | 1854 Webb, William H.                            |
| 1890 Turner, Elisha, Torrington, Conn.                   | 1866 Wendell, Jacob. (L. F.)                     |
| 1890 Thorp, John R.                                      | 1868 White, Alexander M.                         |
| 1890 Thorn, Samuel.                                      | 1870 Webster, Sidney.                            |
| 1890 Tyng, T. Mitchell.                                  | 1870 Wilson, Gen. Jas. Grant. (L. F.)            |
|  | 1870 Wright, E. Kellogg.                         |
| 1884 Utter, Dr. Francis A.                               | 1870 Ward, T. W.                                 |
| 1888 Uhl, Edward. (L. F.)                                | 1872 Wetmore, Wm. Boerum. (L. F.)                |
| 1889 Underhill, A. M.                                    | 1872 Wells, Jacob.                               |
|  | 1873 Wiener, Joseph, M.D. (L. F.)                |
| 1854 Viele, Gen. Egbert L.                               | 1874 Weyman, Charles S.                          |
| 1868 Van Santvoord, C.                                   | 1874 Wheeler, Everett P.                         |
| 1870 Van Brunt, Hon. Chas. H. (L. F.)                    | 1874 Wetmore, Hon. George P. (L. F.)             |
| 1874 Van Rensselaer, Kiliaen.                            | 1874 Walraven, Ira E.,<br>Philadelphia, Pa.      |
| 1875 Van Buren, John D.                                  | 1875 Work, J. Henry.                             |
| 1875 Valentine, Lawson.                                  | 1875 White, David,<br>Ft. Montgomery, N. Y.      |
| 1875 von Post, H. C. (L. F.)                             | 1875 Winslow, Gen. Edward F.                     |
| 1875 Vanderpoel, A. Ernest.                              | 1875 Whitehead, Comdr. Wm., U.S.N.               |
| 1876 Van Hoesen, Hon. George M.                          | 1875 White, Loomis, L.                           |
| 1876 Van Brunt, Cornelius.                               | 1876 Wedemeyer, A. J. D.,<br>Liberty, N. Y.      |
| 1877 Vanderbilt, Cornelius. (L. F.)                      | 1877 Ward, W. S., Denver, Colo.                  |
| 1878 Vanderbilt, William K. (L. F.)                      | 1877 Waters, James T.                            |
| 1880 von Hesse, Christian.                               | 1877 Woodruff, Col. D., U. S. A.                 |
| 1881 Vantine, A. A.                                      | 1878 Whitehead, Henry M.                         |
| 1883 Van Sinderen, Adrian.                               | 1878 Whittemore, Charles.                        |
| 1884 Van Siclen, Geo. W.                                 | 1879 Watson, Francis A. (L. F.)                  |
| 1885 Valentine, Henry C.                                 | 1879 Williams, Richard P.                        |
| 1886 Valenzuela, Enrique.                                | 1880 Wilson, James. (L. F.)                      |
| 1887 Voorhees, Charles H., M.D.,<br>New Brunswick, N. J. | 1881 Wilson, John.                               |
| 1887 Van Alen, J. J., (L. F.)<br>Newport, R. I.          | 1882 Wadsworth, John H.                          |
| 1887 Verastegui, Alberto,<br>Havana, Cuba.               | 1882 Waddingham, Wilson. (L. F.)                 |



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| 1882 Williams, David. (L. F.)                   | 1888 Walsh, F. J.                                |
| 1882 Winthrop, Robert. (L. F.)                  | 1888 Witherbee, Frank S.                         |
| 1883 Wilson, Theodore.                          | 1888 Wynkoop, G. H., M.D.                        |
| 1884 Wheelwright, Wm. D.                        | 1888 West, Frederick T.                          |
| 1884 Watson, George H. (L. F.)                  | 1888 Woodward, Jas. T. (L. F.)                   |
| 1884 Wood, Wm. H. S.                            | 1888 Wendell, Ten Eyck.                          |
| 1886 Wright, Wm. Phillips.                      | 1888 Worthington, Robt. H.                       |
| 1886 Walsh, Richard M. L.                       | 1888 Wolfe, S. B., M.D.                          |
| 1886 White, S. V. (L. F.)                       | 1888 Wetmore, Edmund.                            |
| 1886 Wiman, Erastus.                            | 1888 Winslow, Daniel.                            |
| 1886 Walker, John A.,<br>Jersey City, N. J.     | 1889 Warner, Lucien C.                           |
| 1886 Willets, Edward B.                         | 1889 Wood, Wallace.                              |
| 1886 Whitehouse, J. H.                          | 1889 Wilkins, Chas. H., M.D.                     |
| 1886 White, Horace.                             | 1889 Weber, Christian.                           |
| 1886 Wales, Salem H.                            | 1889 Warfield, Ethelbert D.,<br>Oxford, O.       |
| 1886 Watson, Wm. P.                             | 1889 Webster, Harrison E.,<br>Schenectady, N. Y. |
| 1886 Ward, John E.                              |  |
| 1887 White, Julian Leroy, (L. F.)<br>Baltimore. | 1889 Waterbury, John I.                          |
|   | 1889 Whitehouse, Geo. M.                         |
| 1887 White, William Aug.                        | 1890 Williams, Norman, (L. F.)<br>Chicago.       |
| 1887 White, Alfred T.                           |  |
| 1887 Wilson, J. Wall.                           | 1890 Weir, Chas. G.                              |
| 1887 Wheelock, George G., M.D.                  | 1890 Wadsworth, Herbert, (L. F.)<br>Avon, N. Y.  |
| 1887 White, Andrew J.                           |  |
| 1887 White, Henry, London, Eng.                 | 1890 Wells, Edward, Jr.                          |
| 1887 Whitely, James.                            |  |
| 1887 Wilcox, Stephen.                           | 1874 Young, Mason.                               |
| 1887 Westcott, Clarence L.                      | 1888 Young, Edward F. C.,<br>Jersey City, N. J.  |
| 1887 Welling, W. Brenton.                       |  |
| 1888 West, Hon. George,<br>Ballston Spa, N. Y.  | 1889 Young, Jesse.                               |
| 1888 Whitehouse, W. Fitzhugh.                   |  |
| 1888 Wynkoop, Francis S.                        | 1875 Zollikoffer, Oscar.                         |
|   | 1884 Zabriskie, Andrew C. (L. F.)                |

### FELLOWS AND MEMBERS DECEASED, 1890.

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| D. S. Appleton, November 13.      | Cyrus Butler, December 8.           |
| John Jacob Astor, February 22.    | Henry J. Davison, July 22.          |
| Frederick Billings, September 30. | Gen. Clinton B. Fisk, July 9.       |
| August Belmont, November 24.      | Rev. Thos. Foulke, January 24.      |
| Conrad Braker, Jr., July 21.      | Theodor G. Glaubenslee, April 4.    |
| James M. Brown, July 19.          | Rob't McCoskry Graham, December 13. |

Robert Ray Hamilton, August 23.	Eugene Schuyler, July 18.
Henry L. Hoguet, May 9.	George L. Schuyler, July 30.
Joseph A. Jameson, August 17.	Thomas L. Snead, October 17.
Frederick Kühne, April 19.	Benjamin M. Stilwell, December 9.
John J. Lagrave, April 25.	Robert M. Strebeigh, October 16.
Edward Lambert, October 10.	William H. Swan, July 5.
Edwin Mead, Jr., March 14.	Gen. Alfred H. Terry, December 16.
James Monteith, August 11.	Edmund Terry, February 11.
Frederick Pearson, December 23.	John B. Trevor, December 22.
Antonio Raimondi, October 31.	A. A. Vantine, January 26.
Clinton G. Reynolds, May 20.	Ira E. Walraven, April 7.
Miss Julia Rhinelander, October 11.	Jacob Wells, September 15.
Daniel S. Riker, June 10.	Charles H. Wilkin, M.D., June 6.

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*List of Foreign and Domestic Geographical and other Scientific Bodies with which this Society is in Communication and Constant Exchange of Publications.*

ALASKA :

Alaskan Society of Natural history and Ethnology, Sitka.

ARGENTINE REPUBLIC :

Academia Nacional de Ciencias, Córdoba.

Instituto Geográfico Argentino, Buenos-Aires.

Sociedad Geográfica Argentina, Buenos-Aires.

AUSTRALIA :

Royal Society of Queensland, Brisbane, Queensland.

Queensland Museum, Brisbane.

Melbourne Observatory, Melbourne, Victoria.

Royal Society of Victoria, Melbourne, Victoria.

Public Library, Museum, and National Gallery, Melbourne.

Department of Mines, Sydney, N. S. W.

Linnean Society of New South Wales, Sydney, N. S. W.

Royal Society of New South Wales, Sydney, N. S. W.

AUSTRIA :

Ferdinandeum, Innsbruck.

Akademie der Wissenschaften, Krakau.

Gesellschaft der Wissenschaften, Prague.

K. K. Akademie der Wissenschaften, Vienna.

K. K. Geographische Gesellschaft, Vienna.

K. K. Geolog. Reichsanstalt, Vienna.

K. K. Naturhist. Hofmuseum, Vienna.

K. K. Militär-Geographisches Institut, Vienna.

**BELGIUM :**

Société Belge de Géographie, Antwerp.  
Académie Royale de Belgique, Brussels.  
Société Royale Belge de Géographie, Brussels.

**BRAZIL :**

Bibliotheca Nacional, Rio de Janeiro.  
Instituto Historico, Geographico, e Ethnographico do Brazil, Rio de Janeiro.  
Museu Nacional, Rio de Janeiro.  
Observatorio, Rio de Janeiro.  
Secção da Sociedade de Geographia de Lisboa no Brazil, Rio de Janeiro.  
Sociedade de Geographia, Rio de Janeiro.  
Comm: Geog: e Geologica da Prov: de S. Paulo, S. Paulo.

**CALIFORNIA :**

California Historical Society, Berkeley.  
University of California, Berkeley.  
Historical Society of Southern California, Los Angeles.  
California Academy of Sciences, San Francisco.  
Geographical Society of the Pacific, San Francisco.  
Mercantile Library Association, San Francisco.  
State Mining Bureau, San Francisco.

**CANADA :**

Hamilton Association, Hamilton, Ontario.  
Geological and Natural History Survey of Canada, Ottawa.  
Royal Society of Canada, Ottawa.  
Geographical Society, Quebec.  
Literary and Historical Society, Quebec.  
Canadian Institute, Toronto.

**CHILE :**

Der Deutsche Wissenschaftliche Verein, Santiago.  
Observatorio Astronómico, Santiago.  
Oficina Central de Estadística, Santiago.  
Oficina Hidrográfica de Chile, Santiago.

**CHINA :**

China Branch of the Royal Asiatic Society, Shanghai.  
Statistical Department, Inspectorate-General Imp. Maritime Customs, Shanghai.

**CONNECTICUT :**

Scientific Association, Meriden.  
Connecticut Academy of Arts and Sciences, New Haven.  
Library of Yale University, New Haven.  
Ferguson Library, Stamford.

**COSTA RICA :**

Oficina de Dep. y Canje de Publicaciones, San Jose.  
La Gaceta, Diario Oficial, San José.

DENMARK :

- Royal Danish Academy of Sciences, Copenhagen.
- Royal Danish Geographical Society, Copenhagen.

DISTRICT OF COLUMBIA :

- Philosophical Society, Washington.
- Smithsonian Institution, Washington.
- Department of State, Washington.
- Bureau of Education, Washington.
- Coast and Geodetic Survey, Washington.
- Bureau of Ethnology, Washington.
- Geological Survey, Washington.
- Library of Congress, Washington.
- National Geographic Society, Washington.
- Metropolitan Club, Washington.
- Office of Library and War Records, Navy Department, Washington.
- Chief of Engineers, War Department, Washington.

EGYPT :

- Société Khédiviale de Géographie, Cairo.

ENGLAND :

- Royal Cornwall Polytechnic Society, Falmouth.
- Literary and Philosophical Society, Liverpool.
- Royal Asiatic Society, London.
- Royal Geographical Society, London.
- Royal Society, London.
- Meteorological Office, London.
- Statistical Society, London.
- Victoria Institute, London.
- Literary and Philosophical Society, Manchester.
- Manchester Geographical Society, Manchester.
- Statistical Society, Manchester.
- Tyneside Geographical Society, Newcastle-upon-Tyne.
- Royal Geological Society, Penzance.
- Yorkshire Philosophical Society, York.

FRANCE :

- Société d'Etudes Scientifiques, Angers.
- Académie des Sciences et Belles Lettres, Angers.
- Société de Géographie Commerciale, Bordeaux.
- Société des Sciences Naturelles, Cherbourg.
- Union Géographique du Nord de la France, Douai.
- Société de Géographie Commerciale, Havre.
- Société de Géographie, Lille.
- Société de Géographie, Lyons.
- Société de Géographie, Marseilles.
- Société Languedocienne de Géographie, Montpellier.
- Société de Géographie, Paris.

Société de Géographie Commerciale, Paris.  
 Société de Topographie, Paris.  
 Soc. Académique Indo-Chinoise, Paris.  
 Soc. d'Etudes Japonaises. Paris.  
 Société de Géographie, Rochefort.  
 Société de Géographie, Rouen.  
 Société de Géographie, Saint-Nazaire.  
 Société Académique Franco-Hispano-Portugaise, Toulouse.  
 Société de Géographie, Toulouse.  
 Société de Géographie, Tours.  
 Société Polymathique du Morbihan, Vannes.

## GERMANY :

Kolonialgesellschaft, Berlin.  
 Kaiserl. Statist. Amt, Berlin.  
 Königl. Preuss. Statist. Bureau, Berlin.  
 Gesellschaft für Erdkunde, Berlin.  
 Königl. Preuss. geologisch. Landesanstalt, Berlin.  
 Geographische Gesellschaft, Bremen.  
 Geographische Gesellschaft, Carlsruhe.  
 Verein für Erdkunde, Darmstadt.  
 Verein für Erdkunde, Dresden.  
 Naturforschende Gesellschaft, Emden.  
 Physikal. Verein, Frankfurt-a-M.  
 Verein für Geog. und Statistik, Frankfurt-a-M.  
 Naturwiss. Verein des Reg.-Bezirks, Frankfurt-a-O.  
 Naturforschende Gesellschaft, Görlitz.  
 K. Gesellschaft der Wissenschaften, Göttingen.  
 Geographische Gesellschaft, Greifswald.  
 Verein für Erdkunde, Halle-a-S.  
 Leopoldino-Carolina Akademie, Halle-a-S.  
 Geographische Gesellschaft, Hamburg.  
 Geographische Gesellschaft, Hanover.  
 Geographische Gesellschaft, Jena.  
 Naturwiss. Verein für Schleswig-Holstein, Kiel.  
 K. Gesellschaft der Wissenschaften, Leipzig.  
 Verein für Erdkunde, Leipzig.  
 Geographische Gesellschaft, Lübeck.  
 Verein für Erdkunde, Metz.  
 Akademie der Wissenschaften, Munich.  
 Geographische Gesellschaft, Munich.  
 Verein für Handelsgeographie, Stuttgart.  
 Verein für Vaterländ. Naturkunde, Stuttgart.  
 Verein für Naturkunde, Wiesbaden.

## GUATEMALA :

Direccion General de Estadística, Guatemala.



Ministerio de Fomento, Guatemala.

HUNGARY :

Gewerbeschule, Bistritz.

Hungarian Academy of Sciences, Buda-Pest.

Hungarian Geog. Society, Buda-Pest.

Royal Hungarian University, Buda-Pest.

Verein für Siebenbürg: Landeskunde, Hermanstadt.

Ungar. Karpathen-Verein, Lőcse.

ILLINOIS :

Chicago Historical Society, Chicago.

INDIANA :

Brookville Society of Natural History, Brookville.

IOWA :

Academy of Natural Sciences, Davenport.

Historical Society, Iowa City.

IRELAND :

Natural History and Philosophical Society, Belfast.

Royal Dublin Society, Dublin.

ITALY :

Sez. Fiorentina della Società Africana, Florence.

R. Biblioteca Naz. Centrale, Florence.

Società d'Esplorazione Commerciale, Milan.

Società Africana d'Italia, Naples.

Biblioteca Nazionale Centrale Vittorio Emanuele, Rome.

Società Geografica Italiana, Rome.

British and American Archæological Society, Rome.

Dir. Gen. della Statistica, Rome.

JAPAN :

Asiatic Society, Yokohama.

Geographical Society, Tokyo.

Imperial University of Japan, Tokyo.

Seismological Society, Tokyo.

JAVA :

Bataviaasch Genootschap van Kunsten en Wetenschappen, Batavia.

MARYLAND :

Naval Institute, Annapolis.

MASSACHUSETTS :

Appalachian Mountain Club, Boston.

State Library, Boston.

Massachusetts Historical Society, Boston.

Public Library, Boston.

Atlantic Monthly, Boston.

American Statistical Association, Boston.

Peabody Museum, Cambridge.

Library of Harvard University, Cambridge.

American Association for the Advancement of Science, Salem.  
Essex Institute, Salem.  
Peabody Academy of Science, Salem.  
American Antiquarian Society, Worcester.  
Society of Antiquity, Worcester.

MEXICO :

Museo Nacional, Mexico,  
Observatorio Meteorol: Magn. Central, Mexico.  
Sociedad Mexicana de Geografía y Estadística, Mexico.  
Sociedad Científica "Antonio Alzate," Mexico.  
Ministerio de Fomento, Mexico.  
Observatorio Astronómico Nacional de Tacubaya, Mexico.

MICHIGAN :

Public Library, Detroit.

MINNESOTA :

Academy of Natural Sciences, Minneapolis.  
Geol. and Nat. History Survey, University, Minneapolis.  
Minnesota Historical Society, St. Paul.

MISSOURI :

Academy of Sciences, St. Louis.

NEBRASKA :

State Historical Society, Lincoln.  
University of Nebraska, Lincoln.

NETHERLANDS :

Aardrijks. Genootschap, Amsterdam.  
K. Instituut voor de Taal-L-en V-van Nederlandsch-Indië, The Hague.  
Nederlandsch Meteor: Instituut, Utrecht.

NEW HAMPSHIRE :

Dartmouth College, Hanover.

NEW YORK :

State Museum of Natural History, Albany.  
State Library, Albany.  
Long Island Historical Society, Brooklyn.  
Society of Natural Sciences, Buffalo.  
Academy of Sciences, New York.  
New York Historical Society, New York.  
New York Linnean Society, New York.  
Library of Columbia College, New York.  
Am. Museum of Nat. History, New York.  
Vassar Brothers Institute, Poughkeepsie.  
Academy of Science, Rochester.  
Oneida Historical Society, Utica.  
U. S. Military Academy, West Point.

NEW ZEALAND :

The New Zealand Institute, Wellington.

NORWAY :

- Royal University, Christiania.
- Central Bureau of Statistics, Christiania.

OHIO :

- Cincinnati Society of Natural History, Cincinnati.
- Western Reserve and Northern Ohio History Society, Cleveland.

PENNSYLVANIA :

- Academy of Natural Sciences, Philadelphia.
- Second Geological Survey of Pennsylvania, Philadelphia.
- Franklin Institute, Philadelphia.
- Historical and Geological Society of Wyoming, Wilkesbarre.

PORTUGAL :

- Academia Real das Sciencias, Lisbon.
- Commissão Central Permanente de Geographia, Lisbon.
- Sociedade de Geographia, Lisbon.
- Ministerio de Marinha e Ultramar, Lisbon.

ROMANIA :

- Societatea Geog. Română, Bucharest.

RUSSIA :

- Société de Geographie Finlandaise, Helsingfors.
- Société de l'Histoire Naturelle, Kazan.
- Société des Naturalistes, Kief.
- Section Géographique de la Soc. Imp. des Amis des Sciences Naturelles,  
Moscow.
- Société des Naturalistes de la Nouvelle Russie, Odessa.
- Imperial Russian Geographical Society, St. Petersburg.
- Imperial Academy of Sciences, St. Petersburg.
- Caucasian Section of the Imp. Russ. Geog. Society, Tiflis.

SCOTLAND :

- Geological Society, Edinburgh.
- Royal Society, Edinburgh.
- Scottish Geographical Society, Edinburgh.
- Philosophical Society, Glasgow.

SOUTH CAROLINA :

- Charleston Library Society, Charleston.

SPAIN :

- Sociedad Española de Geografia Comercial, Madrid.
- Sociedad Geográfica, Madrid.
- Observatorio Meteorológico de Manila, Filipinas.

SWEDEN :

- University of Lund, Lund.
- Central Bureau of Statistics, Stockholm.
- Society for Anthropology and Geography, Stockholm.
- Société Royale des Sciences, Upsal.

## SWITZERLAND :

Mittelschweizer : Geog.:-Comm. Gesellschaft, Aarau.

Hist. und Antiq. Gesellschaft, Basle.

Geographische Gesellschaft, Bern.

Société de Géographie, Geneva.

Soc. Neuchâteloise de Géographie, Neuchâtel.

Geog. Comm. Gesellschaft, St. Gall.

Antiquarische Gesellschaft, Zurich.

## TENNESSEE :

State Board of Health, Nashville.

## WISCONSIN :

State Historical Society, Madison.

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Almanach de Gotha, 1890; Goldsmid's Hakluyt, vols. 13-16, Edinburgh, 1889-1890; Mountaineering in Colorado, by F. H. Chapin, Boston, 1889; Reisebilder aus Liberia: 1879-1882, 1886-1887, von J. Büttikofer, vol. 1, Leiden, 1890; History of the Pacific States of N. America, by H. H. Bancroft, vols. 19, 20, 26, 33, 34, San Francisco, 1890; Travels in the Free States of Central America, by Carl Scherzer, 2 vols. in 1, London, 1857; Rig Veda Americanus, Sacred Songs of Ancient Mexicans, by D. G. Brinton, Philadelphia, 1890; Nouvelle Géographie Universelle: Amérique Boréale, par Elisée Reclus, Paris, 1890; Hakluyt Society's Publications: Tractatus de Globis et Eorum Usu. A Treatise Descriptive of the Globes, constructed by Emery Molyneux, and published in 1592 by Robert Hues, Edited with annotated Indices, and an Introduction by Clements R. Markham, C.B., F.R.S., London, 1889; Les Colonies Françaises: Océan Pacifique, Paris, 1889; Stanley au Secours d'Emin Pasha, par A. J. Wauters, Paris, 1890; Le Brésil en 1889, avec une Carte, etc., par F. J. de Santa-Anna Nery, Paris, 1889; Apianus: Cosmographicus Liber, Landisutæ, 1524; Apianus et Gemma Frisius: Cosmographia sive Descriptio Universi Orbis, Antverpiæ, 1584; Félix de Azara; Voyages dans l'Amérique Méridionale, 4 vols. and Atlas, Paris, 1809; Boturini Benaduci, Idea de una Nueva Historia General de

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'87 in the Soudan, by A. B. Wylde, 2 vols., London, 1888; Life of Sir R. I. Murchison, by A. Geikie, 2 vols., London, 1875; Report on Inland Navigation from Hudson River to Lakes Ontario and Erie, Albany, 1811; Remains of Lost Empires, by P. V. N. Myers, New York, 1875; Catalogue of Early Newspapers, Oxford, 1865; Summer in Baden-Baden, by Eugene Guinot, London, n. d.; Travels in Chaldea, by Capt. Robert Mignan, London, 1829; Recollections of Mexico, by Waddy Thompson, New York and London, 1846; Les Anglais et les Hollandais dans les Mers du Nord, par l'amiral Jurien de La Gravière, 2 vols., Paris, 1890; Bartholomew's Library Reference Atlas, London, 1890; Story of Emin's Rescue as told in Stanley's Letters, edited by J. Scott Keltie, New York, 1890; A Visit to Stanley's Rear Guard, by J. R. Werner, Edinburgh and London, 1889; From Pekin to Calais by Land, by H. de Windt, London, 1889; Travels in the Atlas and Southern Morocco, by Joseph Thompson, London, 1889; Problems of Greater Britain, by (Sir C. W. Dilke), London and New York, 1890; Two Kings of Uganda, by R. P. Ashe, London, 1889; American Commonwealths: California, Connecticut, Indiana, Kansas, Kentucky, Maryland, Michigan, Wisconsin, New York, Ohio, Oregon, Virginia, 13 vols., Boston, 1883-1890; Adventures of Captain Bonneville, U. S. A., by Washington Irving, New York (1868); Astoria, by Washington Irving, New York, 1888; The Century Dictionary, edited by William Dwight Whitney, vols. 3 and 4, New York, 1890; Copie d'une Lettre Escripte par le Père Jacques Bigot, Manate; Deux Lettres: Lettres au Père Renault: Relation 1676-77; Mission aux Abnaquois, Nouvelle York; La Vie du Rév. Père Chaumonot, Nouvelle York; Suite de Sa Vie (Chaumonot) Nouvelle York; Relation de ce qui s'est passé, etc., par le Père Dablon, Nouvelle York; Relation de la Mission du Missispi, Nouvelle York; Extrait des Aventures de Mathieu Sâgean, Nouvelle York; Captivité du P. Milet parmi les Onneiouts, Nouvelle York; Affaires du Canada, 1696, Nouvelle York; Dreuilletes, Epistola, Nouvelle York, in all 10 volumes of the Cramoisy Series; P. Margry: Mémoires et Documents, etc., l'histoire des Français, 6 vols., Paris, 1879-1888; Relations Inédites (1672-1679), Paris, 1861; Voyages de Découvertes au Canada, 1534-1542, Québec, 1843; Annual Catalogue (American and English), New York and

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L'Art de Vérifier les Dates, 3 vols., folio, 1783-1787; Kort Beskrifning om Provincien Nya Sverige uti America (Campanius) 4to, Stockholm, 1702; Lorenzana, Historia de Nueva España, etc., 4to, México, 1770; La Vie du R. P. Pierre, J. M. Chaumonot, écrite par lui-meme, 1688 (reprint) Nouvelle York, 1858, 8vo; Suite de la Vie du R. P. P. J. M. Chaumonot (reprint), Nouvelle York, 1858, 8vo; Relation du Voyage des Premières Ursulines à la Nouvelle Orléans (reprint), Nouvelle York, 8vo, 1859; Journal de la Guerre du Micissippi contre les Chicachas (reprint), Nouvelle

York, 1859, 8vo ; Relation ou Journal du Voyage du R. P. Jacques Gravier (reprint), Nouvelle York, 8vo, 1859 ; Relation de ce qui s'est passé, etc., les années 1672 et 1673, par le R. P. Claude Dablon (reprint), Nouvelle York, 4to, 1861 ; Relations Diverses sur la Bataille du Malangueulé, 1755 (reprint), Nouvelle York, 4to, 1860 ; Mission du Mississippi du Séminaire de Québec en 1700 (reprint) Nouvelle York, 4to, 1861 ; Extrait de la Relation des Aventures et Voyages de M. Sâgean (reprint), Nouvelle York, 8vo, 1863 ; Relation de sa Captivité parmi les Onneiouts en 1690-91, par le R. P. Pierre Milet (reprint), Nouvelle York, 4to, 1864 ; Recueil de Pièces sur la Négociation, etc., ès années 1648, et s. (reprint), Nouvelle York, 8vo, 1866 ; Relation des Affaires du Canada en 1696 (reprint), Nouvelle York, 4to, 1865 ; Le R. P. Gabriel Dreuillettes : Epistola ad Dominum Ill. Joannem Wintrop, Sc. (reprint), Neo-Eboraci, 4to, 1869 (*These reprints from the Cramoisy Press*) ; Historia Verdadera de la Conquista de la Nueva España, por Bernal Diaz del Castillo, Madrid, 4 vols., 8vo, 1795-96 ; Asia Portuguesa, por Manuel de Faria y Sousa, Lisboa, 3 vols., folio, 1674-1703 ; La Segunda Parte de la Historia General : Conquista de México, por Fr. Lopez de Gómara, Anvers, 12mo, 1554 ; Historia General de las Indias, por Fr. Lopez de Gómara, Anvers, 12mo, 1554 ; Coleccion de Documentos para la Historia de México, por Joaquin García Icazbalceta, México, 2 vols., roy. 8vo, 1858-1866 ; Vertoogh van Niew Nederland (translated by Henry C. Murphy) New York, 4to, 1854 ; Le Grand Voyage du Pays des Hurons (Sagard), 1632 (reprint), Paris, 2 vols., 8vo, 1865 ; Histoire du Canada, par Gabriel Sagard, 1636 (reprint), Paris, 4 vols., 8vo, 1866 ; History of Brazil, by Robert Southey, London, 3 vols. 4to, 1810-1819 ; Noticias Secretas de America, etc., por Jorge Juan y Antonio de Ulloa, Londres, 4to, 1826 ; Noticias de la Historia General de las Islas de Canaria, por Joseph de Viera y Clavijo, 3 vols., 4to, Madrid, 1772-1776.

*From Cav. Elio Modigliani, Florence :*

Un Viaggio a Nias, per Elio Modigliani, 4to., Milano, 1890.

*From Prince Albert de Monaco, Paris :*

Expériences de Flottage, etc., par Albert de Monaco, 4to., Paris, 1890.

*From F. P. Moreno, La Plata, Argentina :*

Le Musée de La Plata, par F. P. Moreno, 8vo, La Plata, 1890 ;  
Projet d'une Exposition Retrospective Argentine, par F. P. Moreno, 8vo, La Plata, 1890 ; Lettre sur les Musées Argentins, par Henry A. Ward, 8vo, La Plata, 1890.

*From James Mortimer Montgomery :*

Constitution, By-Laws and Rules of Order of the Society of the Sons of the Revolution, 8vo, New York, 1890.

*From Baron F. von Mueller, Melbourne :*

Second Systematic Census of Australian Plants, 4to, Melbourne, 1889.

*From the New Jersey State Geologist :*

Annual Report of the State Geologist of New Jersey, 8vo, Camden, 1889 ; Final Report, 8vo, Trenton, 1889.

*From the New York State Library, Albany :*

State Reservation, Niagara ; 43d Annual Report of the State Museum, State Museum ; Bulletins Nos. 7, 8, 9, 10 ; 42d Report of New York State Museum.

*From the Royal University, Christiania, Norway :*

Ethnografisk Kart over Finmarkens Amt, Nos. 1, 2, 3 (in six sheets).

*From Roque Saenz Peña, Paris :*

Le Zollverein Américain, 8vo, Sceaux, 1890.

*From the Geological Survey of Pennsylvania :*

Atlas Anthracite Region, Parts 2, 3, 5, AA, 8vo, Harrisburg, 1889 ; Dictionary of Fossils, Vols. 2 and 3, 8vo, Philadelphia 1889 ; South Anthracite Field, Part 3, 8vo, Philadelphia, 1889 ; Oil and Gas Region, I, Part 5, 8vo, Philadelphia, 1890.

*From Gen. J. Watts de Peyster :*

Atlas pour l'Histoire Générale des Voyages, 4to, Paris, 1740-1774 ; Le Grand Dictionnaire Géographique et Critique de Bruzen La Martinière, folio, 9 vols., La Haye, Amsterdam et Rotterdam, 1726-1739 ; Lithologie Atmosphérique : Des Pierres Tombées du Ciel, par Joseph Izarn, 8vo, Paris, Floréal, An XI., 1803.

*From the Produce Exchange :*

Report of the New York Produce Exchange, 1889-90, 8vo, New York, 1890.

*From the Prussian Statistical Bureau, Berlin ;*

Zeitschrift, Heft 2, 1889, Heft 1, 1890.

*From John C. F. Randolph, Author :*

Informes sobre las Minas, etc., de Tolima, Colombia.

*From Chandler Robbins :*

Map showing the Railroad between Lake Erie, New York and Boston, 1842 ; a map by Evert Van Wickle, showing Tract of Land on Genesee River, New York, 1803 ; A New Voyage Round the World in the Years 1768, 1769, 1770, and 1771 ; undertaken by order of His Present Majesty, Performed by Capt. James Cook, in the ship *Endeavour*, Drawn up from his own Journal, and from the Papers of Joseph Banks, Esq., F.R.S., and published by the special Direction of the Right Honourable the Lords of the Admiralty. By John Hawkesworth, LL.D., and late Director of the East India Company. In Two Volumes : With Cutts and a Map of the Whole Navigation, 2 vols., 12mo, New York, 1774.

*From E. Schernikow :*

A New Geographical, Historical and Commercial Grammar ; and Present State of the Several Kingdoms of the World, etc. By William Guthrie. Third Edition, 8vo, London, 1771.

*From Charles Scribner's Sons, New York :*

The Viking Age : The Early History, Manners and Customs of the Ancestors of the English-Speaking Nations, illustrated from the Antiquities discovered in Mounds, Cairns and Bogs, as well as from the ancient Sagas and Eddas. By Paul B. Du Chaillu, 2 vols., 8vo, New York, 1889.

*From the Royal College of Physicians, Edinburgh, Scotland :*

Reports of Laboratory, Royal College of Physicians, vol. 2, 8vo, Edinburgh, 1890.

*From the Société Académique Indo-Chinoise de France, Paris :*

Mémoires de la Société Acad. Indo-Chinoise de France, 4to, Paris, 1879.

*From Francis A. Stout :*

A General Catalogue of Books, etc., on Zoology and Geology, by Louis Agassiz, 4 vols., 8vo, London, 1848-1854 ; Course of the River Mississippi, a Map drawn in 1765, by Lieut. Ross, of the 34th Regiment, London, 1775 ; An Exact Chart of the River St. Lawrence, by Thomas Jefferys, London, 1775 ; A New Map

of North America, with the West India Islands (in two sheets), London, 1786 ; Jacques Cartier, *His Life and Voyages*, by Joseph Pope, 8vo., Ottawa, 1890 ; *Voyage au Pays du Tadoussac*, par J. Edmund Roy, 8vo, Quebec, 1889 ; *Guide to the Maritime Provinces, Dominion of Canada*, 8vo, Boston, 1890 ; *Newfoundland : As It Was and As It Is in 1877*, by Rev. Philip Tocque, 8vo, Toronto, 1878 ; *De Zeden der Wilden van Amerika*, door J. F. La Fiteau, 4to 'sGravenhage, 1731.

*From the Swedish Government :*

68 Statistical Documents.

*From E. E. Taché, Assistant Commissioner Crown Lands, for the Province of Quebec, Canada :*

*Surveyed Townships and Explored Territory of Quebec*, 8vo., Quebec, 1889.

*From Dr. J. Van Raemdonck, Saint-Nicholas (Waas) Belgium :*

*La Première Réduction de la Grande Carte de Flandre*, par J. Van Raemdonck, 8vo, Saint Nicolas (Waas), 1889 ; *Découverte des Deux Premiers Exemplaires Connus de la Grande Carte d'Europe, (1554) et de la Carte des Iles Britanniques (1564) de Gérard Mercator*, par Dr. J. Van Raemdonck, 8vo, Saint Nicolas (Waas) 1890 ; *Gérard Mercator Rupelmondois et Non Anversois*, par Dr. J. Van Raemdonck, 8vo, Saint Nicolas (Waas) 1890.

*From Frank Vincent :*

*Around and About South America*, by Frank Vincent, 8vo, New York, 1890 ; *In and Out of Central America and other Sketches and Studies of Travel*. By Frank Vincent, 8vo, New York, 1890.

*From the U. S. Coast and Geodetic Survey, Washington, D. C. :*

Bulletins 14-18, Notice to Mariners, 132.

*From the Director of the Mint, Washington, D. C. :*

Report of the Director, 1890.

*From the Bureau of Education, Washington :*

Circular of Information, 1890 ; Bulletin No. 1, 1890 ; Indian Education ; National Educational Association, Meeting of 1889 ; Dictionary Catalogue, 2d Edition ; English-Eskimo Vocabulary ; Federal and State Aid to Higher Education ; Honorary Degrees in American Colleges ; Teaching of Mathematics in the United States ; Education in Alabama, 1702-1889.

*From the Bureau of Ethnology, Washington, D. C. :*

Fifth Annual Report, and Sixth Annual Report of Bureau, by J. W. Powell, Director, 8vo, Washington, 1887 and 1888.

*From the U. S. Fish Commission, Washington, D. C. :*

Bulletin, vol. 7.

*From the U. S. Geological Survey, Washington, D. C. :*

Topographical Atlas of the United States, 90 sheets; Reports of the Geological Survey for 1886-87 and 1887-88; Monographs XV. and XVI., and Vol. 1, 1890; Bulletins 54-61, 63, 64 and 66; Mineral Resources, 1888.

*From the Hydrographic Office, Washington :*

Pilot Charts, of the North Atlantic, January-December, 1890; Chart No. 1120, East coast of Central America; Gulf of Honduras and approaches; No. 1165, West Indies: Island of Saint Lucia, Port Castries; No. 1166, West Indies: Anchorages Island of Saint Lucia; Grand Cul de Sac Bay and Marigot Harbor; No. 1168, British Guiana: Mouths of the Demerara and Essequibo Rivers; No. 1170, Eastern Archipelago: West part of Java Sea and Southern Passages to China; No. 1172, Peru: Huacho Bay and Chancay Bay; No. 1173, Nova Scotia: Sheet Harbor and Adjacent Anchorages; No. 1174, Chili: Ports Caldera and Calderilla; No. 1175, West Coast of Newfoundland: Ports Saunders and Keppel and Hawke harbors; No. 1176, South America: Coasts of Colombia and Ecuador, Panama to Cape San Francisco; No. 1177, South America: Coasts of Ecuador and Peru, Cape San Francisco to Paita; No. 1178, Peru: Coast from Paita to Pisco; No. 1179, Dominion of Canada: Gulf of St. Lawrence, Miramichi Bay (New Brunswick); No. 1180, Peru: Independencia Bay; No. 1181, Chili: Cobija Bay and Gatico Cove; No. 1182, West Coast of Newfoundland: Savage Island Anchorage and Old Port au Choix; No. 1183, Peru: Port Islay and Port Mollendo; No. 1184, Peru: Port Santa; No. 1185, Peru: Port Samanco, or Guambacho; No. 1186, Nicaragua: Harbor of San Juan del Norte, or Greytown; No. 1187, Argentine Republic: Bahia Blanca; No. 1188, Eastern Archipelago: Java, Batavia Roads; No. 1189, Supplement to H. O. Chart 68 (of Behring's Sea and Arctic Ocean); No. 1190, Peru: Casma Bay and Huarmey Bay; No. 1191, Brazil: Rio Grande do Sul; No. 1192, West Coast of Lower California: South Bay (Cerro Island); No.



1193, West Coast of Lower California : San Quentin Bay to Cerros Island ; No. 1194, West Coast of Lower California : San Benito Islands ; No. 1195, Peru : Lomas Road and Ports of San Juan and San Nicholas ; No. 1196, South Coast of Cuba : El Portillo ; No. 1197, Arctic Ocean : Dominion of Canada, Sketch of Herschel Island ; No. 1198, Guano Islands in the Pacific : Baker Island and Howland Island ; No. 1199, Peru : Ilo Road ; No. 1201, Peru : Port Bermejo ; No. 1202, Chili : Port Papudo and Horcon and Quintero Bays ; No. 1204, West Coast of Lower California : Port San Bartolomé ; No. 1206, China Sea : Singapore New Harbor ; No. 1209, Chili : Approaches to Coronel and Lota (Aranco Bay) ; No. 1210, West Indies, Island of Santo Domingo : Manzanillo Bay ; No. 1211, Guano Islands in the Pacific : Canton Island (Swallow, or Mary Island), Canton Island Anchorage ; Phoenix Island ; No. 1212, Chili : Lavata Bay and Pan de Azúcar Anchorage ; No. 1213, Peru : Salaverry Road ; No. 1214, Atico Road ; No. 1200, Pennsylvania : Lake Erie, Erie Harbor ; No. 1205, East India Archipelago : Singapore and Rhio Straits ; No. 1207, Dominion of Canada : Quebec Harbor ; No. 1208, Portugal : Approaches to the River Tagus and the Harbor of Lisbon ; No. 1215, Flores Island : Rio de la Plata ; No. 1216, Hawaiian Islands, with Islands and Reefs to the Westward ; No. 1217, Gulf of St. Lawrence : Caraquette, Shippegan, and Miscou Harbors, Bay of Chaleurs ; No. 1218, Coasts of Peru and Chili : Pisco to Arica ; No. 1219, Coast of Chili : Arica to Caldera ; No. 1220, Coast of Chili : Caldera to Valparaiso ; No. 1221, Samoan Islands : Upolu, Safatu Harbor ; No. 1222, Coasts of the Argentine Republic : Bahía Blanca to Rio Negro ; No. 1223, Gulf of California : Pichilínque Harbor (La Paz Bay) ; No. 1224, Azores : Fayal Channel, with Horta and Pim Bays ; No. 1225, Gulf of Mexico : Laguna de Terminos, Western Entrance ; No. 1226, Bahamas : Wide Opening (Exuma Sound) ; No. 1227, Bahamas : The Fleeming, or Six Shilling Channel (N. E. Providence Channel) and Ship Channel (Exuma Sound) ; No. 1228, Gulf of Mexico : Laguna de Terminos, Puerto Real Entrance ; No. 1229, North America : Gulf of California, La Paz Harbor ; No. 1230, Philippines : Luzon Island, Manila Bay ; No. 1231, Island of Santo Domingo : Republic of Haiti, Cape Haiti Harbor ; No. 1232, Chili : Concon Cove ; No. 1233, Gulf of Mexico : Cay Arenas ; No. 1234, Gulf of Mexico :

Arcas Cays, Campeche Bank ; No. 1235, Gulf of Mexico : Sisal Anchorage and Reefs ; No. 1236, Dominion of Canada: The Gut of Canso, with its Southern Approaches, and Chedabucto Bay; No. 1237, Dominion of Canada, Cape Breton Island : Great and Little Bras d'Or Lakes, with their Approaches.

*From the U. S. Naval Observatory, Washington, D. C.:*

Observations, 1884.

*From the Bureau of Navigation, Washington, D. C. :*

Information from Abroad, No. 9 ; American Ephemeris and Nautical Almanac, 1893.

*From the Smithsonian Institute, Washington, D. C. :*

Reports, 1886 and 1887 ; Report of the National Museum ; Proceedings of the National Museum, Vols. 10, 11 and 12 ; Bulletins of the National Museum, Nos. 33-37 and 38 ; Bureau of Ethnology : Earthworks of Ohio, Problem of Ohio Mounds, Textile Fabrics of Peru, Bibliography of the Muskoghean Languages, Bibliography of the Iriquoian Languages ; Contributions to Knowledge, Vol. XXVI.

*From the Department of State, Washington, D. C. :*

Reports of Consuls, 22 numbers, Foreign Relations of the United States, 1889 ; International Marine Conference at Washington, 3 vols., 1890.

*From the War Department, Washington, D. C. :*

Report of Chief Signal Officer, 2 vols., 1889 ; Report of Geographical Surveys West of the 100th Meridian, Vol. I., 1890 ; 89 War Maps, and Two Sheets Topographical Map of the Yosemite Valley.

*From Henry Whittemore, New York :*

Steam Navigation in America, by Henry Whittemore, 4to, New York, 1890.



PART I.

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TRANSACTIONS

OF

THE SOCIETY FOR THE YEAR  
1890.



# TRANSACTIONS OF THE SOCIETY FOR 1890.

Annual meeting of the American Geographical Society, held at Chickering Hall, January 14, 1890, at 8 o'clock, P. M.

Vice-President CULLUM in the chair.

On motion, it was voted to dispense with the reading of the minutes of the last meeting.

The following persons were elected Fellows of the Society :

N. Pendleton Schenck, S. H. Mallory, Gerald N. Stanton, Chas. W. Mackey, James H. Benedict, Alphonse Montant, Elbridge G. Snow, Jr., A. Schwarzmunn, W. H. Perkins, Frank Nelson Olcott, Wm. J. Sewell, John W. Sprague, Norman Williams, Franklin Fairbanks, John F. Barnard, D. G. Purse, Jay Ewing, Gordon E. Sherman, Geo. F. Potter.

The annual report of the Council was then presented and read :

NEW YORK, January 14, 1890.

Since the last annual report there have been held six regular and two special meetings of the Society, nine stated and eight special meetings of the Council.

At the annual meeting on the 15th of January, 1889, Mr. Henry Ballantine delivered a lecture on "The Vale of Cashmere."

At the meeting of January 28, Mr. Carl Lumholtz, of Christiania, Norway, gave an account of his "Residence among the Aborigines of Australia."

At the meeting of February 11, Dr. Titus Munson Coan made an address on the "Sandwich Islands : their Volcanoes and People."

At the meeting of March 12, the Rev. Lysander Dickerman read a paper on the "Discovery of a Forgotten Nation (the Hittite Empire)."

At the meeting of April 16, Mr. F. A. Ober delivered a lecture on "Algeria, with a glance at Tunisia."



At the meeting of October 28, Miss A. Russell addressed the Society on the "South African Republics : their Races and their Progress, their Diamond and Gold Mines."

At the meeting of November 11, Mr. Cope Whitehouse made an address on the subject of the "Raiyan Moeris : the Irrigation of Ancient and Modern Egypt."

At the meeting of December 9, Miss Amelia B. Edwards delivered a lecture on "Recent Discoveries in Egypt."

At the meeting of December 19, the Rev. George W. Chamberlain, of S. Paulo, spoke on the "Condition and Prospects of Brazil."

All the lectures were illustrated by views and maps.

The quarterly Bulletins have been issued with regularity, and it has been found necessary to increase the edition, in order to meet the demands caused by new accessions to the roll of Fellows and by the growth of our Exchange list.

The additions to the Library and Map Room number 2801, viz. : Books 845, Atlases 2, Maps and Charts 178, and Pamphlets 1776.

The annual report of the Treasurer, Mr. Walter R. T. Jones, shows a balance on hand of \$2708.50.

On revising the work of the year, the Council feels that the Society may be congratulated upon the evidences of its steady progress and on the strength of the position won by its well-directed energies.

WILLIAM REMSEN,  
*Chairman of Council.*

The Nominating Committee then presented the following report:  
To the American Geographical Society :

The Nominating Committee, appointed to select officers to fill vacancies, under resolution of the Society passed at the meeting of December 19, 1889, respectfully reports the selection of the following nominees for election in accordance with Chapter 5, Section 2, of the By-Laws :

*For President*—Charles P. Daly, LL.D., term to expire January, 1891.

*For Vice President*—Francis A. Stout, term to expire January, 1893.

*For Treasurer*—Walter R. T. Jones, term to expire January, 1891.

*For Domestic Corresponding Secretary*—James Mühlenberg Bailey, term to expire January, 1893.

*For Councillors*—William Remsen, Clarence King, Edward King, John A. Hadden, Christian Börs, terms to expire January, 1893.

N. P. BAILEY, *Chairman*,  
CLINTON ROOSEVELT,  
CHARLES A. PEABODY,

*Nominating Committee.*

On motion, Mr. Clinton Roosevelt was appointed to cast the vote of the Society for the nominees, and they were declared duly elected.

President Daly then came forward and delivered his annual address: "On the History of Physical Geography."

On motion, the Society adjourned.

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Meeting of February 10, held at Chickering Hall.

Vice-President CULLUM in the chair.

It was voted to dispense with the reading of the minutes of the previous meeting.

The following persons were elected Fellows of the Society:

D. L. Bliss, Edward L. Plumb, J. O'Dwyer, M.D., J. M. Andreini, B. Gerson Oppenheim, O. B. Douglas, M.D., Ferdinand C. Valentine, M.D., Sir Donald A. Smith, James J. Hill, J. Sergeant Price, George H. Vose, Robert T. Davis, M.D., Thomas C. Smith, Lorenz Reich, Charles M. Marvin, Chas. F. Roe, U. S. A.

The Chairman then introduced to the Society Mr. Watson Griffin, of Montreal, who read a paper on "Canada: the Land of Waterways."

On motion, the Society adjourned.

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Meeting of March 10, held at Chickering Hall.

President DALY in the chair.

The reading of the minutes of the previous meeting was dispensed with.

The following persons were elected Fellows of the Society:

Wm. H. Simonson, Samuel Thorne, Horatio Alger, Jr., Wm. M

Goldthwaite, Henry W. Farman, Charles F. Dellinger, Charles F. Brooker, Edwin S. Coles, A. Carter, Jr., B. L. Ackerman, C. G. Currier, M.D., Miss Mary T. Cockcroft, Hugh R. Garden, Harold Clemens, J. Arden Harriman, John R. Thorpe, Arthur A. Anderson, Joseph Bushnell, John J. Astor, James C. Bergen, Daniel B. Fearing, Elisha Turner, Hilary R. Chambers, Hon. John Davis, J. Bertschmann, John Carwick, C. Gray Dinsmore, Wm. Dulles, Jr., Walter B. James, M.D.

The President then introduced to the Society Prof. Henry W. Haynes, of Boston, who read a paper on "The Roman Wall in Britain."

On motion, the Society adjourned.

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Meeting of April 14, held at Chickering Hall.

Vice-President CULLUM in the chair.

On motion, the reading of the minutes of the previous meeting was omitted.

The following persons were elected Fellows of the Society :

John Lyon Gardiner, Charles H. Godfrey, Hon. Chas. S. Fairchild, Gen. Leopoldo Ferrero, Samuel Swan, M.D., Robert Alfred Sands, M.D., Edward Clarkson Potter, Herbert Wadsworth, Chas. G. Wier, George E. Porter, Hon. Thos. N. McCarter, Julian Bedford Shope, John Scott Boyd, F. Wayland Fellowes, C. A. Du Vivier, Caleb S. Green, Charles Martin, M.D., Chas. L. Lamberton, Wm. S. Neilson, Gen. Fitz John Porter, Chas. H. Raymond, John Newton, Edward Wells, Jr., Edward R. Johnes, Joseph Loth, Stockton Hough.

Vice-President CULLUM then introduced to the Society Prof. Chas. Sprague Smith, who delivered a lecture on "Modern Iceland."

On motion, the Society adjourned.

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Meeting of October 27, held at Chickering Hall.

President DALY in the chair.

On motion, it was voted to dispense with the reading of the minutes of the previous meeting.

The following persons were elected Fellows of the Society :

Henry Janin, Seymour L. Husted, Jr., C. O. Brewster, Robert McCoskry Graham, John W. Mackay, Maj. Wm. R. Livermore, U. S. A., Walter Irving, Alanson T. Enos, Dr. H. R. Palmer, Henry W. Poor, George W. Breckenridge, Francis Schell.

President DALY then introduced to the Society Mr. Paul B. Du Chaillu, who delivered a lecture on "The Ancestral Home of the English Race."

On motion, the Society adjourned.

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Meeting of November 10, held at Chickering Hall.

Vice-President CULLUM in the Chair.

On motion, the reading of the minutes of the previous meeting was omitted.

The following persons were elected Fellows of the Society :

J. Angus Manning, James C. Goldthwaite, Wm. D. Ryder, Wm. H. Crane, Robt. B. Roosevelt, Eugene Smith, C. W. Kempton.

Vice-President CULLUM then presented to the Society Dr. H. Carington Bolton, who made an address on "Four Weeks in the Wilderness of Sinai."

On motion, the Society adjourned.

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Meeting of December 8, held at Chickering Hall.

President DALY in the Chair.

The reading of the minutes of the previous meeting was, on motion, omitted.

The following persons were elected Fellows of the Society :

Ernest Schernikow, William Astor Chandler, A. Urban.

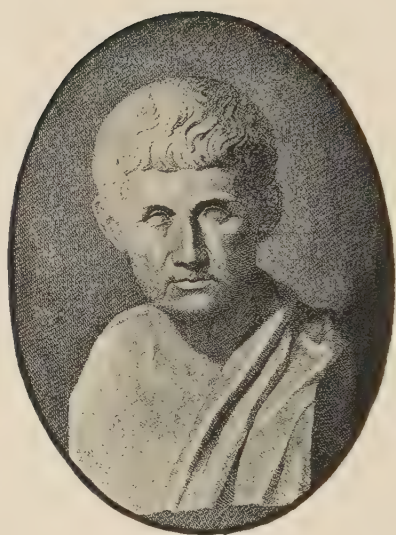
President DALY then introduced to the Society the speaker of the evening, the Rev. Horace C. Hovey, who delivered a lecture on "The Mammoth Cave in Kentucky."

On motion, the Society adjourned.









ARISTOTLE

BULLETIN  
OF THE  
AMERICAN GEOGRAPHICAL SOCIETY

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Vol. XXII

1890

No. 1

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ANNUAL ADDRESS

OF

CHAS. P. DALY, LL. D., PRESIDENT OF THE SOCIETY.

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ON THE HISTORY OF PHYSICAL GEOGRAPHY.

I have made the subject of my annual address this year the History of Physical Geography. I have selected this subject because it is one that, so far as I know, has not yet been generally inquired into, and because the information that is requisite to a knowledge of it is not to be found in the ordinary works of reference or encyclopædias, but has to be gathered from many sources and over a wide field of inquiry. Before entering upon its history it will be, perhaps, appropriate that I should first state what the Science of Physical Geography is.

Alexander Von Humboldt in his last and greatest work, "Cosmos," divides the subject of which he treats into two parts: 1st, the physical system of the Universe, and 2d, the physical system of the Earth, the latter being, in a general way, what is now understood by the Science of Physical Geography.

It embraces the form and movements of the earth, the

configuration of its surface, the aërial covering or atmosphere that surrounds it, the relative distribution of land and water, the currents of the air and of the sea ; the distribution of heat, the magnetic influence that affects the earth, and many other details of a physical nature relating to it, which were formerly embraced under the general head of Geography, but which are now taken from it and arranged into a distinct and separate science.\*

Humboldt's idea of science is mind applied to nature. "Science," he says, "begins for man the moment that his mind lays hold of matter, and he endeavors to subject the mass of material that has accumulated into rational combinations."

This is Sir John Herschel's idea of the Science of Physical Geography. "It takes," he says, "the heap of particulars that is stored up by descriptive geography, to present them as a harmonious whole, by showing that they are all bound up together by mutual relations or inter-agencies and are all subordinate to a great scheme of providential arrangement."†

The history of this science is a history of how man acquired his knowledge of the true nature of the earth and of the physical laws or phenomena connected with it. It is a history that naturally begins with the first impressions that he had of the earth and its phenomena, which

\*Humboldt included in it the geographical distribution of plants and animals, but W. E. Cooley in his recent treatise omits this as more appropriately belonging to the sciences of Botany and Zoology. (*Cooley's Physical Geography, Preface vii. London, 1876.*)

†Cooley defines it more strictly as that department of science which embraces the course of physics reigning on the earth's surface, over land, sea and air, and of which, as it depends to some extent on the features of that surface, Geography is a-function. (*Cooley's Physical Geography, Preface.*)

carries us back to a very primitive age, and suggests at the outset what knowledge we can possibly have of man's impressions respecting the earth, at a period so remote.

Niebuhr says, in his Historical Lectures, that if we exclude the history of the earth and confine ourselves to the history of mankind, we can go back only to those times, the traditions of which have come down to us, as the history of nations and of periods, before the discovery of the art of writing, is buried in impenetrable darkness. At the time, he says, when our traditions begin, we find the earth inhabited by a number of different races, distinguished from each other by their manners and their customs, as they are now, and that the further we go back the more we find that the languages were distinct and the nations foreign to each other; and he concludes with the remark that whether these nations were originally of different origin, or whether their original identity was gradually changed in form and in language, we cannot arrive at any certain knowledge without a distinct revelation from God, and that upon these points the Book of Genesis cannot be considered as a revelation.

It is now about sixty years since these words were uttered by one of the most acute and learned historical critics that ever lived, and yet within that comparatively short time prodigious strides have been made towards a knowledge of that period, which to Niebuhr was one of impenetrable darkness.

The studies in comparative philology, or to speak more plainly, of different languages, have disclosed that many nations, that for centuries have been separately

distributed over the globe and apparently wholly distinct from each other, are in fact connected together by the common tie of language, and are all descended from a single stock or people who spoke one tongue.

The discoveries that have since been made in Egypt, the oldest civilization so far as our present knowledge extends, as well as upon the sites of the Chaldean, Babylonian, Assyrian, Arabian and other ancient civilizations, such as temples, tombs, dwellings, inscriptions, engraved gems, cylindrical tablets, records and documents in clay, works of art and pictorial representations of customs, amusements and domestic life, as well as of the industrial arts, which have been brought together and studied under what has now become a new science, that of comparative archæology, have shed a flood of light on ancient civilizations that were wholly unknown half a century ago, and another science, that of comparative mythology, has revealed man's beliefs respecting the earth and many other things, up to a very primitive period.

Not only has all this been acquired, but within the same time researches have been carried on and discoveries made in respect to primitive man that disclose very plainly what was his original state in every part of the globe.

There was formerly a widespread and persistent belief which, as I shall presently show, was of Egyptian origin, that there was once what was called "A Golden Age;" in which everything that was necessary to man's existence was produced without his instrumentality; an age of innocence and of happiness, of abundance without toil, of ideal justice, of peace and equality, during

which a perpetual Spring made the earth an abode of delight.\*

This belief had a great fascination for the classic poets, and as its long continuance shows, for mankind generally ; for it was pleasant to think of a time when there was no evil, but everything was virtuous and good.

The labors of the ethnologist and the anthropologist, however, prove that there never was such an age. Their researches and discoveries show that so far as the remains of man, or of anything pertaining to him have been found, his early condition was everywhere the same, that his first state was one in which he depended for subsistence upon fishing, the chase, and the wild fruits of the earth ; the state of a hunter or fisher, as appears in the fact that in the earliest deposits in which his remains have been discovered, the rude implements of bone or of stone, with which he fished, hunted or killed the wild animals upon which he subsisted, are found with him ; a condition that has not yet entirely passed away, but one in which he is still found, in Australia and in other parts of the earth.

His next and more advanced stage was, in those countries where the climate allowed it, that of the possessor of flocks and herds, moving about from place to place as pasturage was afforded, a state still existing, and to a considerable extent, in certain parts of Asia : and the next was when he settled down in fixed abodes as an agriculturist ; when men congregating together began the building of towns, the founding of cities and the formation of nations.

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\* La Rousse, *Le Grand Dictionnaire Universel du XIX<sup>e</sup> Siècle*, ART. *Âges*.



That, before this, man lived everywhere in what has been called a stone age, is attested by the fact that on the sites of the most ancient civilizations his rude stone implements have been found, such as stone axes, spear-heads, flint arrow-heads, etc. In Egypt, along the banks of the Nile, and for a considerable distance over Northern Africa, these rude stone implements have been discovered, attesting that before this early civilization began the men who used these rude implements dwelt there.

What is especially striking in the recent researches of the ethnologists, is the wide distribution of these remains throughout the earth, and the great length of time that man must have been an inhabitant upon it. "In every part of the globe," says the Marquis de Nadaillac, one of the most recent investigators of the subject, "in all latitudes, under all climates, the chipped flints (*les silex*), whether they are simply cut, or polished by persevering labor, present an analogy which strikes the most superficial observer." \*

This early distribution of savage man all over the globe is the more remarkable when it is considered that the early stages of civilization were not favorable to the growth of geographical knowledge. When men who had formerly wandered about as hunters and fishers settled down to the cultivation of the earth as a more certain means of subsistence, what they wanted was to be let alone. They had no desire to know anything of the countries and the people about them, and what they desired more especially was that nothing should be

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\* *Moeurs et Monuments des Peuples Préhistoriques*, par le Marquis de Nadaillac, Paris, 1880.

known about them, as these outside wandering and warlike tribes, that were ever in quest of food, might suddenly descend upon them and sweep away all the fruits of their industry. In fact, this goes on at the present day in certain parts of north-eastern Asia, where the hill tribes, in seasons when game or other means of subsistence is scarce, come down upon the peaceful agricultural dwellers of the plains and carry off their cattle and everything that they have stored up as food. Even the Indians in our own country, when they have settled down as agriculturists upon the lands allotted to them by the government, have a hard struggle ; not from the inroads of warlike tribes in their vicinity, but from the friendly nomads, who, in the winter, when food is scarce, frequently come and claim the right of hospitality in such numbers that everything that the settled Indians have laid up for themselves is consumed. In fact, what man wanted in the earliest stages of civilization was isolation and security, and when we consider this we may form some conception of how difficult was the growth and development of early civilizations.

During the last half century the question has also been extensively discussed, whether man, in all the varieties in which we find him now, is the product of a single race, or whether there was originally a diversity of races. The difficulty in this question is, that men have now become so intermixed by the intercommunication that has been going on for a great length of time, that the traces of an original distinction, if it ever existed, must now be nearly obliterated, and all, I think, that can be said respecting this investigation is, that nothing has been absolutely proved.

Another marked feature in this general inquiry, has been the rise during the last thirty years, or perhaps I should say the revival, of what has been called the theory of Evolution, and, as growing out of it, the inquiry known as the Origin of Species, and the Descent of Man, commonly called Darwinism.

As the science of geology has proved that the order in which plants and animals have appeared upon the earth has been from simple to more complex organizations, or, as the geological divisions show, the law of progress is from lower to higher forms, a fact which I apprehend is now generally accepted, Darwin and his followers have undertaken to show that the way in which this takes place is that there is a tendency in all species, whether of plants or animals, to branch off into varieties, most of which perish, while some survive, to transmit their peculiar differences or varieties to their offspring, so that a new species is thereby created, which in time becomes permanent; and that this has been going on for long periods of time, and will account for all the varieties that now exist, whether in plants, animals, or in the human species. There is, these writers say, constantly going on a struggle for existence, in which the capable survive and the weaker perish; which Darwin expresses by the term "natural selection," and Herbert Spencer calls "the survival of the fittest." And that this has gone on until it has culminated in man, the highest and most perfect of organisms.

I simply state what this theory is as I understand it, without undertaking to discuss it. In such an inquiry as I am making into the early history of man, his relations to the physical phenomena by which he was sur-

rounded, and his early impressions respecting it, I could not well pass over an investigation to which so many scientific men have given their attention, and which has been so earnestly discussed by those who believe in it and by those who do not.

It is sufficient to say that this theory stops with the assumption that all plants and animals came from primordial germs. It does not undertake to explain how these primordial germs came into existence, or how, or why the liquid substance, that is found in the cells of the lowest organisms, is endowed with motion and is the source of life; so that life, except as a direct act of the Creator, is as much a mystery as ever, a result warranting the remark of Dr. Scoffern that while Science removes mysteries, it, in doing so, opens up other mysteries.

This theory, I should further state, ignores a spiritual nature in man. At least Darwin had no belief in it, believing only in the natural operation of forces, although W. R. Wallace, the co-originator of the theory, as I gather from a recent notice of his last work, does believe in it, and seeks to harmonize it with his theory.

Edmund Burke pithily said that man was a "religious animal," and certainly all knowledge of him in the past warants the general conclusion that some form of religious belief is a necessary aliment of his nature, and that he will be slow to accept any theory in respect to his origin, or his nature, that does not admit this.

There is another matter in which our knowledge has been greatly enlarged since the time of Niebuhr: it is in respect to the earth itself. For this we are indebted

to the geologists, and I cannot give it more appropriately than in the recent language of one of our most eminent American geologists, Professor Joseph Le Conte. "There was a time," says Professor Le Conte, "not many decades ago, when all things, the origin of which transcends our ordinary experience, were supposed to have originated suddenly and without natural process ; there was a time when mountains were supposed to have been made at once, with all their wonderful diversified forms, their beetling cliffs, their thundering waterfalls, their gentle slopes and smiling valleys, as we find them. But now we know that they have become so only through a very gradual process, and that they are still changing. There was a time when continents and seas, gulfs, bays and rivers, were supposed to have originated at once, substantially as we see them. Now we know that they have been changing through all geological time, and are still changing. There was a time when rocks and soils were supposed to have been always rocks and soils—when soils were regarded as an original clothing, made on purpose to hide the nakedness of the new-born earth. Now we know that rocks rot down to soils, that soils are carried down and deposited as sediments and that sediments are consolidated into rocks ; the same materials being worked over and over again, passing through all these stages many times in the history of the earth ; for there was a time when it was thought that the earth, with substantially its present form, configuration and climate, was made at once, out of hand, as a fit habitation for man and animals. Now we know that it has been changing, preparing, becoming what it is, by a slow pro-



cess, through a lapse of time so vast, that the mind sinks exhausted in the attempt to grasp it."

This suggestion, of the great changes that the earth has undergone, brings us to the period when its surface was brought into a condition more nearly resembling what it is now, and which is the one where the science of geology may be said generally to end, and that of physical geography to begin. This is the time of the deluge, the Chaldean record of which is found in the Book of Genesis. Over various parts of the globe traditions exist of a deluge. Catlin states that among 120 tribes of Indians that he visited in North and South America, there was not a tribe that did not have a tradition of a deluge. Xenophon mentions five deluges during certain supposed periods, and the order of succession in which they occurred, the fourth of which was called by the Greeks the Deucalion Deluge, which was believed to have continued for three months.\* The Chinese have a record of a great inundation 2300 B. C., which overflowed the principal rivers of China.† And among the Assyrian discoveries of George Smith was a tablet or clay memorial containing a detailed account of a deluge substantially the same as the one narrated in Genesis.‡

But the occurrence of a great physical event of this kind does not depend alone upon these traditions. A geological examination of that large part of Russia known as the Steppes, shows from the configuration of the surface and the marine deposits throughout it, that the whole of this great area was once the bottom of a

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\* L'Océan Ancien, p. 41. † Catlin's Letters, vol. 1., p. 181. ‡ Howorth, The Mammoth and the Deluge, p. 446.



shallow sea, which, in the opinion of the traveller Tournefort, extended as far as the northern part of the Caucasus and there formed two vast gulfs, one of which was the Caspian Sea and the other the Euxine or Black Sea. Moreau de Jonnes, in a work "*L'Océan Ancien*," an author of extensive learning and great acuteness, maintains that this is the ocean of Homer, who did not, he insists, refer to the Atlantic, which, in Homer's time, was unknown beyond the Straits of Gibraltar. This author, de Jonnes, in view of the marine deposits that are spread over the whole of this region of the steppes, and other facts, such as that certain portions of the northern coasts of Europe are now rising, thinks that the comparatively flat bed of this ancient ocean was gradually raised, until it reached a certain point of elevation, when the whole of its vast sheet of water, extending from the mountains of Thrace to the Caucasus, was precipitated upon the plains of northern Asia, in an inundation so sudden and so widespread, that it swept everything before it, involving an enormous destruction of animals and human life; and that this great physical event left that part of northern Asia, which had theretofore supplied these animals with food, the sterile waste that it is now, and greatly changed the configuration of the surface of Asia, from the Sea of Aral to the Straits of the Bosphorus.

Mr. H. H. Howorth, in a very recent work, *The Mammoth and the Flood*, has brought together not only the many legends of different people in various parts of the earth, but a great array of facts from the explorations of travellers and the labors of archæologists and palæontologists, which, to quote his words, "Points unmistakably

to a widespread catastrophe, involving a flood upon a great scale." He shows that, before this event, the climate of northern Siberia was temperate and equable, where the mammoth existed in such prodigious numbers that the traffic in the ivory left by its remains has now been going on for more than a century; and that these animals perished by some great catastrophe operating simultaneously over a wide area is proved, he thinks, because the condition in which their remains are discovered does not indicate an ordinary death, as they are tumbled, tossed, and heaped up together in large mounds, frequently upon the tops of hills, showing that the catastrophe in which they perished was such as would be produced by the onward movement of tumultuous waters in some great inundation or flood.\*

The Duke of Argyll, with that careful consideration that marks the investigations of this distinguished man, thinks it highly probable that in comparatively recent times great changes occurred, altering the earth's surface over a large part of Europe, and with a rapidity that caused a great destruction of animal life†; and facts gathered by American investigators indicate a like state of things and from a like cause in North America.

But it is to the period of the great Asiatic Deluge and what followed it that my inquiries more particularly relate, for although the earliest remains of man have been found in America, it was in Asia, so far as the present state of our knowledge indicates, that the earliest civilizations began; that of Egypt in the valley of the Nile, and those of Chaldea, Babylonia and Assyria in the valleys of

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\* Howorth, *op. cit.* ch. xi.

† Address before the Edinburgh Geological Soc. in 1883.

the Euphrates and Tigris; and it is the conception, which the men who founded these civilizations and their successors had of the physical phenomena by which they were surrounded, to which my inquiry is especially directed.

That these early civilizations began with, and grew out of the pastoral state, appears in their religion and their most ancient symbols. Their earliest worship was associated with the animals that belong to that state, such as the bull, the cow, and domestic animals generally. The ox was adored at Memphis, the ram at Thebes. The crook of the shepherd and the barb of the cowherd were the royal emblems or symbols of the Pharaohs, and the horn of the bull encircles the mitre of the Assyrian kings.\* What the ideas of these early civilizations were of the earth and of physical forces generally, we have two means of knowing; first from the ideas which savages have who are now in the condition in which these early people were, and secondly, by a study of the mythology of these early civilizations.

The mythologies of ancient nations were long supposed to have been merely the invention of priests and of poets. The Italian poet Boccaccio, about 500 years ago, appears to have been the first to question this general impression. He devoted most of his time in the latter part of his life to an elaborate study of them, and came to the conclusion that they were allegories symbolizing moral truths, and he undertook to explain many of them from this point of view. Two hundred years later, Bacon took up these investigations, coming also to the conclusion that they were allegories, and he devoted a

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\* *L'Océan Ancien*, p. 50.

great deal of his time unprofitably to guess at their meaning. Here the inquiry ended until the beginning of the present century, when the scientific study of languages and of comparative grammar, with the important results that followed it, drew attention to these mythologies and an elaborate and careful study of them has revealed the fact that these myths are man's earliest impressions of many matters affecting him, and what is important for our subject, that, while they include many other things, they exhibit the progressive stages of his belief respecting the physical phenomena by which he was surrounded. They embodied and expressed the popular belief and were diminished, enlarged, readjusted or otherwise changed as these early people advanced in civilization, but amid the many changes which they underwent they always continued to express the popular belief. Out of them and based upon them, the priests constructed their theogonies or religious systems, but did not create the myths, nor did the poets, who merely embellished them and gave them a more poetical form.

A considerable portion of them are what are called Nature myths, which show what these early people's ideas were of the earth, of the heavens and of the causes which produced thunder, the lightning, the wind, the rain, the dew, the snow, the hail and the more violent forces of nature which they saw in the destructive sweep of the tornado, the belching forth of volcanic fires and the shock of the earthquake.

All this appears when we investigate the nature myths of these early nations; and as we follow up the myth through its many changes to its more archaic or first form, we find that the conceptions which these early

people had of physical phenomena, were substantially the same as those which we find among people living in a primitive state at the present day.

As a matter of general observation, savages give little attention to physical phenomena or the operations of nature, except where they are personally affected. Bruce, the traveller in Africa, frequently asked the negroes what became of the sun during the night, and whether we should see the same sun or a different one, in the morning ; but they uniformly regarded the question as childish, and had evidently never thought upon the subject.\* And when Dobrizhoffer, the Jesuit missionary, asked the Abipones, an equestrian tribe of South America, with whom he passed several years, whether the wonderful course of the stars and heavenly bodies had never raised in their minds the thought of an invisible being, who had made and guided them in their course, he received the very practical reply, that their ancestors had never cared to think about such matters, finding ample occupation for their thoughts in the providing of grass and water for their horses.

But where the operations of nature are destructive in their effects, it is otherwise. The impression then made is vivid. Men recognize the existence of a power by the injury it produces, and regard it as their enemy. We find this in our own period. The Payuguán Indians of North America rush out with fire-brands and with clenched fists against the wind that threatens to blow down their huts ; the Esthonians of Russia throw stones and knives against an approaching whirlwind ; the Kalmucks fire guns at the storm ; the Namaguas shoot poisoned arrows against

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\*Park's Travels, Vol. 1. p. 265, and Lubbock's Origin of Civilization, 5.



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it, and in the Aleutian Islands a whole village will unite and shriek against the raging wind.\*

They recognize, as I have said, a superior power that produces the effects which they witness, and we learn from the myths that early man's conception of that power was that it came from gigantic animals in the sky resembling those with which he was familiar on earth, such as the fierce beasts to whose constant attacks he was at that early period especially exposed. Thus, in the early Asiatic myths, the thunder is a huge bellowing bull that drags a great wagon across the sky, the noise of the wheels of which is heard in the rumbling sound that follows; the lightning is a great sinuous serpent that darts from the sky with a zig-zag motion and strikes with the same deadly effects as the venomous serpent of the earth, and the whirlwind or hurricane is a great wild boar that tears up the earth as he rushes along. We find the same general conceptions among the American aborigines. To the Indians of the Northwest coast, the thunder is a huge bird that sweeps across the sky, the noise being the flapping of his great wings, and the rumbling sound that is heard is the flapping and cry of the young brood that follows him; and the Tupas of Brazil believe that the watering of their crops is by this great bird, who admonishes them of his presence, by the mighty sound of his voice, the rustling of his wings and the lightning that flashes from his eyes.† Among the Algonquins the lightning was an immense snake,‡ and among the Hurons the hurricane was a gigantic serpent who had on

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\* J. A. Farrar's *Primitive Manners and Customs*, p. 2. Schwartz, *der Ursprung der Mythologie*, p. 46.

† Brinton, *Myths of the New World*, 2d ed., p. 108. ‡ Id. 118.

his head a great horn with which he tore up the trees and everything that stood in his way.\*

These illustrations might be greatly multiplied. De Gubernatis in his work on Zoological Mythology has given an account of 119 mythical animals of this kind ranging from the elephant to the ant; all of which have their prototypes in the animals that exist upon the land, in the water or in the air, in whose existence, supposed attributes and powers man has believed; and I am disposed to think that the worship of animals by the Egyptians, whatever changes it may afterwards have undergone, had its origin in the first stages of their civilization when, like other primitive people, they may be supposed to have believed that the physical phenomena they witnessed, especially in its destructive effects, came from animals in the sky, whose power they dreaded, whom they thought it necessary to conciliate and who consequently became objects of worship as supernatural forces. This appears to me more probable than any of the reasons that have been given for the origin of this strange worship by the many writers who have considered it, from Diodorus Siculus to Wilkinson.

From this first conception of gigantic animals throughout the sky, from whom proceeded all the effects that man witnessed, he came to the further conception of great creatures that not only combined in one the powers of several animals, but were endowed also with human intelligence; as we find in the images of Assyrian gods with the body of a bull, the wings of a huge bird and a human head; thus uniting the greatest animal strength and the fullest power of flight with the

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\* Brinton, p. 119.

highest intellectual capacity ; after which comes the conception of Gods, wholly in the human form, but with the power of transforming themselves into animals of any kind, and the final conception of one or more superior Gods, the greater deity having his abode in the sun, or constituting the sun itself, the next in the order of superiority being the moon, with the domestic relation between the two of man and wife, the sun being regarded as representing the masculine principle and the moon the feminine ; the first representing the ruler of the heavens and the latter of the earth ; the sun in the oldest civilization, that of Egypt, being worshipped under the name of Osiris and the moon as Isis, or the earth ; and this worship of the sun and moon existed not only in Egypt, but, under different names and forms, in the ancient civilizations of Asia and largely among the aboriginal tribes of America.

The recognition of what was beneficent in the operations of nature was of slower growth, and it was this that ultimately led to the worship of the sun. It was the most conspicuous object in the heavens, the source of light and heat, and the cause of the fertility of the earth, and was therefore regarded, or rather the god that personified it, as the most beneficent thing in the universe. But this was not the case everywhere. To the African, in certain parts of that continent, as well as to the Arab of the desert, it was not the sun, to whose burning heat he was exposed during the day, but the moon, that chased away the darkness and by whose light he could travel in the cool, refreshing period of the night, that was the beneficent deity. But in more northern countries where the change of the seasons brought about

the alternation of heat and cold, the sun was looked upon as the source of all fertility, and the most beneficent of Gods.

To primitive man there was nothing more mysterious than the transition from day to night, from light to darkness, and nothing in the operations of nature is so interwoven in the myths of early nations as this. The general idea was that there was a conflict constantly going on between the great beneficent spirit represented in the sun, by whatever name the Sun God was called among different people, and the spirit of evil, whose form was either that of a great serpent, or dragon, or some other huge object, whom the sun god was constantly attacking or resisting; the conflict between them in the air appearing in the storm, the tempest and the hurricane; the thunder being regarded as the noise of the strife, and the lightning, the darts that were hurled. And when the sun, after his apparent motion across the heavens, disappeared in the west, it was into the abode of the evil one that he went, the region of darkness, from which he arose victorious in the east in all the splendor of the dawn; the dawn being the loveliest object and the most grateful thing in nature, about which, and of its cause, the most poetical conceptions were formed, as that of a beautiful maiden, the goddess Aurora or Eos, who drove in her chariot of light in the pathway of the sun, as he rose, and moved upward, to burst forth in the fulness of his midday radiance.

This conception of a daily struggle between the powers of light and darkness was of Egyptian origin. The Egyptians believed in one supreme being, self-created and eternal, that existed apart and from whom

those higher gods that created and ruled the world, or struggled for the rule of it, emanated. These were especially three : Osiris, or the sun, Isis, the moon or the earth, and Typhon, the evil one or god of destruction, whose name appears to have survived, in the destructive wind of the Southern ocean bearing that name.

The Egyptians, observing the growth, decay and renovation that goes on in nature, believed, according to Prichard's interpretation of their mythology, that the whole world underwent the same process. That there was in the beginning a golden age of purity and innocence, but that man became so bad through the influence of the evil one, that the entire world was destroyed by a deluge and afterwards renewed, beginning again with a golden age. That this destruction and reconstruction had occurred many times, there having been several golden ages, and that there would be more, until at last, the world would be forever destroyed by fire.\*

Fire was another physical feature of the earth which to early man was mysterious. Not fire as the means of light and heat, but fire coming out of the earth, as an eruptive flame, or breaking forth in the violence of the volcano. In that part of Asia where fire in this mysterious form was chiefly to be seen, it gave rise to one of the great religions of the world, that of Zoroaster, or the worship of fire, a religion that, in the high degree of its morals and the spirituality of its conception, is the nearest to Christianity of all the ancient faiths.

In the N. W. corner of Persia is Azerbaijan, the most fertile and the most beautiful of the Persian prov-

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\* Prichard's Egyptian Mythology.



inces. It is the land of the Ghebers or Fire Worshippers ; a volcanic table land, exhibiting everywhere the proofs of the former action of fire ; and fire is still beneath its surface. To the eastward, jutting out from the western shore of the Caspian Sea, is the lofty peninsula of Apsheron upon which, not far from the town of Baku, is Sourikhani, meaning in the Persian tongue the field of fire, which since at least 1,000 years before Christ has been the holy place of the Ghebers ; its selection as such being due to the circumstance that wherever you there bore a hole in the earth, a burning gas springs up. Here is the sacred temple of the Fire Worshippers with its outward wall perforated by numerous chimneys. Within the enclosure in different parts are altars from which an inflammatory gas arises and in the centre, or in the temple proper, which is open on its four sides, there is a huge jet of a greenish yellow hue, which rises to about the height of three feet, waving to and fro, in which the worshippers recognize, and prostrate themselves before, the mystery of a perpetual flame. The worshippers are now reduced to a mere fragment, the chief portion of them being the Parsees of Bombay, and the mystery has ended in the fact that the soil beneath is a great field of petroleum.

The myths, which show what these early ideas were respecting physical phenomena, are found largely in the Aryan mythology, which is the most satisfactory, for when the Rig Veda or Aryan hymns that contain them were composed, this great race was still in the pastoral state and as it was to a very great extent the parent race of the Hindoos, the Persians, the Greeks, the Romans and of nearly all the nations of modern Europe and

America, these myths can be traced through the early mythologies of these different nations, and are thereby more clearly interpreted.

The Aryans, being a pastoral race, filled the heavens above them with imaginary creatures or objects that are found in the pastoral state, such as the bull, the cow, the ram, the sheep and many of the domestic animals, as well as the scenery and other objects that exist in that state. In the clouds they recognized the celestial cow from whose teeming udders came the moisture that refreshed the earth, celestial maidens who drew the water from fountains and poured it down in rain, and in the soft colored light that appears through the clouds was seen the golden raiment of these celestial virgins.\* A scudding cloud was a horse flying from his pursuers, and the strong winds were antelopes driven by the *maruts*, who direct their course as they rush across the heavens. It was very natural that a people living in the pastoral state, who had constantly before them the clouds in all the changes and diversified forms they assume, should, being wholly ignorant of their true nature, imagine that they saw in the region above them mountains and valleys, rocks, caverns, gigantic animals and forms in human shape. There were also, in addition to this, to mislead them, those atmospherical or optical illusions, such as the forms of men, animals, and other objects reflected against the clouds, as in the Brocken of the Harz, or the mirage of the desert, the rainbow and the double rainbow, the aurora borealis, the milky way, shooting stars, meteors, comets, and other illusions; and as everything they imagined they saw in the clouds was in motion and con-

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\* Kelly's Curiosities of Folk-Lore, p. 7.

stantly changing, it was natural also that it should lead to the further conception of what these imaginary beings were doing, and that out of their supposed actions, passions or affections that these early people should weave, or put together those mythic tales or legends, which reveal to us what their ideas of physical phenomena were.

When the myth in its progressive course had reached the conception that the heavens and the earth were ruled by beings in human shape, who were endowed with supernatural powers, great additions were made of gods and goddesses, whose acts, conflicts and struggles with each other, as well as those of their higher gods, made up a large part of the mythology; and this was further increased by the conception of innumerable invisible spirits of all conceivable kinds that existed in the air, upon the land and in the water, some of whom were malevolent and others friendly, until at last every mountain, hill and valley, every fountain, river or stream, had its appropriate spirit or many of them; which led, especially among an imaginative people like the Greeks and others of the Aryan stock, to the most poetical conceptions of their nature, powers, influence and acts, and out of this grew a mass of legendary lore, much of which survived to a very recent period in the customs, sports and amusements of the peasantry of Europe when the legend itself was forgotten.

I have thus, at considerable length, for it was difficult to compress within narrower limits so extensive an inquiry, undertaken to show what was man's earliest idea of the causes of physical phenomena. To express it briefly, it was, that it all came from the acts of creatures of his own imagination, that peopled the space

above him, to whose beneficence or malevolence he attributed all that was beneficial or injurious to him that took place in nature, and this continued to be his belief during the rise, maturity and decay of great civilizations. How could he come to any other conclusion? Ignorant of the form of the earth, of its daily revolution upon its axis, of its movement around the sun, and of many physical laws with which we are familiar, there was nothing apparent to him but supernatural agency to account for much that he witnessed. His idea of the earth was such as would naturally arise from his position upon it, and the evidence of his senses; that it was a flat, round plain diversified by the irregularity of mountain and valley, with the concave vault of the heavens above it. This was the fundamental idea alike among savage or civilized races, each race or people supposing that where they dwelt was at, or about, the centre of this plain. The sun was supposed to move around it, and the dark region below, into which he descended, and from which he arose in the morning, was the abode of evil spirits and of the spirits of the wicked among men; the entrance to which the Greeks fixed in the Western Ocean, north of the entrance to the Mediterranean; but according to Moreau de Jonnes, before referred to, the earlier and more general belief was that the place of entrance was the Cimmerian Bosphorus, now known as the Strait of Yenikale or Kertch, that connects the Sea of Azov with the Euxine or Black Sea. It was supposed that this great plain or flat earth was surrounded on all sides by an ocean, and that the vault of the heavens was supported by high mountains which were situ-

ated near this ocean at the extremity of the earth. As to how the earth itself was supported, there were different impressions among different people. Thales, the Greek philosopher, and Seneca, six hundred years after him, thought that it floated upon water or some other liquid substance; Anaximander and other Greeks, that it was in the form of a cylinder, the upper part of which only was inhabited, the cylinder floating in the centre of the celestial vault, because there was no reason why it should move from one side to the other. Hesiod and others appear to have thought that it was fastened by roots, the Chinese that it rested on the back of a great tortoise, the Hindoos, upon four elephants that stood upon a tortoise, the Aryans of the time of the Vedas, that it stood upon twelve columns between which the sun and moon passed through. But our time will not admit of enumerating more of these conceptions.

When or by whom the rotundity of the earth was first conceived we do not know. All that we know is that a late Greek writer, Diogenes Laertius, says that Parmenides,\* an aged follower of Pythagoras, who came to Athens in the time of Socrates, was the first person who asserted that the earth was of a spherical form and was situated in the centre of the universe; which may be true, as we know that Socrates believed the earth to be a globe which was kept fixed in its place by the pressure on every part of it of the surrounding atmosphere, which he said he had been told by a learned person. Aristotle, fifty years later, came to the conclusion that it was round, from the form of its shadow upon the sun during an eclipse and from the fact that in going across a

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\* Diogenes Laertius. B. IX., Parmenides.



level plain or in passing over the sea, the upper part of an object became visible before the lower, and his general view was that the earth stood immovable and was the centre of the universe. This continued to be a general belief among subsequent geographers down to the time of Cosmas, in the sixth century of our era, who disputed it and maintained with what were very ingenious arguments at that time, that it was an oblong plain enclosed upon its four sides by high walls.

In my annual address upon the history of Cartography, I gave a very full account of all that we know respecting the earliest conception of the earth's rotation upon its axis and its movements around the sun. It will suffice for this occasion to state that more than four centuries before our era, it was suggested by Heraclitus of Ephesus (B. C. 513), that the earth moved; that Philolaus, who was a contemporary of Socrates, maintained that it made a daily revolution around what he called the central fire; and we have it upon the authority of Plutarch that Aristarchus of Samos, B. C. 280, taught that the sun was a fixed star, that the earth moved around it in an oblique circle as well as upon its axis, a theory close to, if it does not embrace, what was afterwards proved by Copernicus.

But the idea that the earth moved found few adherents. Aristotle did not believe it, and Ptolemy, the last of the great geographers, who wrote in the second century of our era, ridiculed the idea that the heavens were immovable and that the earth turned upon its axis, and the world agreed with Ptolemy for thirteen hundred years. Even the idea that it was a globe could not have met with general acceptance, when so great a



writer as Tacitus, who lived in the first century of our era, disputed it.

It is not remarkable that it should have been so, for the discovery of the earth's form and movement is among the great triumphs of the human intellect. The discovery of its rotary motion and its motion around the sun was especially so, for it was one of those discoveries that could not have been made by chance, but must have been the result of long observation and patient thought ; and when it was reached by some bright intelligence, we can readily see that it was almost impossible to get men to believe it. It was difficult to get a man to believe against the evidence of his senses, that the heavenly bodies that he saw in motion, were really not moving, but that it was the earth itself that was in motion ; that the earth, instead of being the flat plain that he saw, with its mountain elevations and sloping valleys, was in fact a round ball or globe, and that instead of being the steadfast immovable thing, that it appeared to him as he trod upon it, it was flying through space at the rate of 74,143 miles an hour, or more than 20 miles a second.

I have only to add to my former observations upon this subject, the probability that the idea that it was not the heavenly bodies but the earth that was in motion did not originate with the Greeks, but came from the Egyptians or the Babylonians. In descending the Nile the passage in certain parts, as we know from ancient writers, was made very rapidly, and as the descent of the Euphrates was made in boats with a light framework of wood covered with skins, they would pass down that river quickly, so that the optical illusion, when we are sailing rapidly

close to the land, that it is not the boat that we are in, but the houses and objects upon the shore that are in motion, must have been one of constant observation ; and as these two nations watched and studied the movement of the heavenly bodies more than any of the nations of antiquity, it may have been that the apparent motion to which I have referred called their attention to the possibility of phenomena of the same nature in the sky, and that like the boat, it was the earth, and not the stars they were looking at, that was in motion.

The belief that this was an Egyptian idea derives support from a statement made by Miss Amelia B. Edwards in her recent lectures in this city, that inscriptions have been found in Egypt, one of which refers to the earth as one of the moving stars, and another that the earth when created was sent out revolving in space.

What we do know is that, whatever may have been the opinion of a few learned men, the general belief of the people was that everything in the nature of physical phenomena that they witnessed either in the sky, or upon the earth, came from supernatural agency.

This was the case in Rome in the time of Lucretius, whose celebrated poem upon the Nature of Things, which was written during the century that preceded our era, was largely devoted to showing that thunder, lightning, storms and other physical phenomena were not, as people supposed, the acts of the Gods, but arose entirely from natural causes. If, says Lucretius, Jupiter and the other Gods shake the heavens with thunder and hurl the lightning whenever they see fit, why do they strike with it the innocent as well as the wicked, and if they hurl thunderbolts at men, why do they do so in solitary places?

the origin and nature of things, and, having adopted some hypothesis, sought for such facts as would support it ; a course that, instead of advancing, retarded the development of the physical sciences.

Aristotle wrote upon atmospheric phenomena, especially upon the winds, in which this great man was not as successful as in his other labors. The winds had a great attraction for the Greeks, and their ideas on the nature of this invisible force rendered it especially suitable for the purposes of their poetry. Four are mentioned by Homer and may be taken, as Bunbury has suggested, as representing in a general way the four cardinal points. They were *Boreas*, the North wind, the bringer of fine weather, although strong and violent, *Notus* the South, or wind of sudden squalls, *Zephyrus* the West or stormy wind, and *Eurus* the East wind, which is but seldom mentioned by the poet.\* Strabo says that some writers held that there were but two principal winds, and that the other winds were only slight differences in the direction of these two ; which he holds to be erroneous, upon the authority of Aristotle and Timosthenes.†

Timosthenes, B. C. 282, a native of Rhodes, who was an admiral in the fleet of Ptolemy Philadelphus, wrote a book, that is now lost, upon harbors, for the benefit of mariners, in which, as we learn from early writers, he distinguished the different countries in their relation to the Mediterranean, which was then thought to be the Central Sea, by the direction from which the winds came ; enumerating twelve different winds, which was the num-

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\* Bunbury's Ancient Geography, vol. I, pp. 36, 37.

† Strabo, B. I., C. II., 21.



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ber that Aristotle had previously fixed upon ; and the division of winds into the number of twelve appears to have been generally accepted thereafter, for we find Seneca, A. D. 60, stating that there were twelve and no more.

Posidonius, B. C. 86, from observations made upon the tides of the Mediterranean, came to the correct conclusion that they were affected by the influence of the moon. He also studied the phenomena of earthquakes and volcanoes, and appears, from the fragments of his writings that have come down to us, to have had a very clear conception of changes in the earth's surface produced by the movements of elevation or subsidence through earthquakes or other physical causes.

Strabo, A. D. 21, in the account which he gives of different countries, in his geography, the most valuable one that has come down to us, brought together much that related to physical geography respecting rivers, mountains, mountain ranges, climates and other matters ; and a century after Lucretius, Pliny the Elder devoted one of the books of his Natural History exclusively to an exposition of the earth and the physical phenomena connected with it. Pliny, however, was not, like Lucretius, an original thinker. He was a compiler ; a man of great industry, who, it would appear, brought together in this particular book whatever he found in the writings of his predecessors or contemporaries respecting the earth and its phenomena, which he arranged under appropriate heads, adding occasionally suggestions of his own. I infer this from the fact that at the end of the book he gives the names of forty-four writers, many of whose works have perished. In addition to which, some of his explanations are inconsistent



with each other, and in certain passages it is difficult to understand exactly what he means. He represents the earth as a ball fixed immovably in the centre of the universe, around which the other objects in space revolve, a misconception that makes many of his explanations of physical facts erroneous. Yet Pliny's work is very valuable, as it evidently contains a very full account of what the learned believed in his time, and shows that considerable progress had been made in this branch of knowledge. Like Lucretius, he ignores all supernatural agency, his explanations in every instance being from supposed natural causes, and yet, what was remarkable, he was a believer in omens and presages, such as, that earthquakes denoted the occurrence shortly thereafter of some great public calamity. His work was long one of authority, and with him ends what I shall have to say of the ancients.

The subject of Physical Geography in the Middle Ages has been investigated by Dr. Konrad Kretschmer, of Vienna, in a work published during the past year, and I cannot present this branch of my inquiry better than by giving a concise statement of the conclusions arrived at by this learned writer, which are sustained by a great number of passages that he has brought together from the works of various writers of that period.

His conclusions may be substantially stated as follows :

The modern conception of geography was not in any sense possible in the Middle Ages. The spirit of those days was essentially a religious one, and it was deeply fixed in the minds of men that the whole circle of science corresponded in its form to the religious idea. What-

soever failed to manifest a direct relation to the spiritual being of man was thrust aside, or pushed, at least, into the remote background. This was the leading idea, even in the works that professed to give descriptions of nature. Men saw in collective nature only the work of God, and they held, therefore, that religious belief alone was able to form conceptions of nature and to explain the phenomena of the creation. Clement of Alexandria, in the fifth book of the *Stromata*, denounces the heresy which admits a distinction between faith and knowledge, and affirms that these are essentially the same and rest on the same foundation. "I believe," he says, "in order that I may understand." Tertullian will hear of no such thing as inquiry. "When we really believe," he says, "we have no desire to believe anything beyond that which we have. For we accept this one thing, that there is nothing farther that we ought to believe."

With such principles the men of the Middle Ages, instead of seeking the origin of phenomena, assumed imaginary causes for them, and the scientific activity of the period spent itself, not in investigation, but in argumentation. Even after the writings of Aristotle had been made known to Western Europe by the Arabian culture, the theological bias controlled the minds of men, and Physics is always treated in their books as a part of Metaphysics.

The ground was moreover too limited for the construction of Physical Geography. The idea of a division of labor in the field of natural science was not yet conceivable. It was the time of those all-embracing mirrors of nature, encyclopædias and summaries which had the Cosmos in all its parts for their subject, the organic,

as well as the inorganic, world. The term geography is hardly ever met with, but in its place we find the expressions, "the nature of things," "the measurement of the world," "the universe," and "the nature of places." In the cloister schools, geometry included geography and the description of nations and countries.

Two influences dominated the intellectual life of the Middle Ages ; the influence of the Bible and that of classical antiquity, and dissimilar as these were, each was regarded as an authority not to be questioned ; and the natural world was interpreted, not by observation and by comparison of facts, but by some text from Genesis, or by some passage from Aristotle. It was not under such conditions that a Physical Geography could be developed. So far, Dr. Kretschmer.

When Copernicus, whom Kepler calls a man of "vast genius," in the 16th century had proved that the earth revolved daily upon its axis and moved annually around the sun, and Bacon's inductive method was generally accepted as the proper mode of investigation in the physical sciences, the basis was laid upon which to found such a science as Physical Geography, but many years elapsed before it took that form.

The great age of maritime exploration and discovery from the 15th to the 17th century resulted in the accumulation of a large amount of physical information respecting the earth, but a long time elapsed before it was made use of in a scientific manner.

Bacon, after the publication in 1620 of his *Novum Organum* projected as a third part of his *Instauratio* what he called a Natural and Experimental History on Phenomena of the Universe, and prepared a catalogue

of the subjects upon which he proposed to write distinct treatises, or as he called them, particular histories, when his time would permit, which were each to begin with a series of interrogations as to the points to be investigated, and the residue of the treatise was to be devoted to answering them. It was an ambitious undertaking, for he catalogued the large number of one hundred and thirty-one distinct treatises, eighteen of which were to be devoted to subjects chiefly relating to atmospheric phenomena. Of these eighteen projected treatises he prepared only two, one of which he called the "History of the Winds" and the other "On the Ebb and Flow of the Sea," the first of which he published a few years before his death. These two show that he was but indifferently qualified for the investigation of the subjects proposed in these eighteen treatises, for, as Humboldt has pointed out, his mathematical, astronomical and physical knowledge was very limited, even for that age, or as Humboldt puts it, he was in these branches of knowledge "far behind his contemporaries."\*

The tract upon the Ebb and Flow of the Sea is, as respects the cause of the phenomena, throughout erroneous. Contrary to what is now accepted, he maintains that the movement is not one of elevation and depression, and the assumption that it was in any way due to the influence of the moon, because of a comparison between its motion and the motion of the moon, he dismisses as a "hasty anticipation;" declaring that "to a careful inquirer, there are certain traces of the truth that may lead to a surer conclusion," and before

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\* 3 Humboldt's *Cosmos*, p. 106, London, 1851.

setting forth what that "surer conclusion" was, I should state that he did not accept the Copernican theory of the movement of the earth, but refers to the assertion that it rotated upon its axis as an "extravagant notion." He not only believed that the heavens revolved around the earth, but sought to account for the course of the east tropical wind, by the suggestion that the atmosphere also probably moved with the heavens around the earth. His explanation of the reciprocal action of the tides once in six hours was this. Erroneously supposing that not only the heavenly bodies but, as he expressed it, the whole universe moved around the earth from east to west in twenty-four hours, he concluded that the sea, being a fluid, moved also in the same direction and that it would move with the heavenly bodies entirely around the earth, but for the fact that its movement was checked by the two hemispheres, the Old and the New World, which, extending through nearly three zones of the globe, acted like a rampart. This, he says, gives a double reaction to the entire mass of waters, thus making a visible ebb and flow twice a day; there being "a double advance and also a double recoil."\*

His treatise on the winds contained many observations respecting them that were accurate. He discarded the idea of the ancients that there was a fixed number of winds, declaring that there was not a region in the heavens from whence the winds did not blow, and that if you divided the heavens into as many degrees as there are in the horizon, wind would sometimes blow from every one of them, as all impulsion of the air was wind; but he recognized the existence of prevailing winds such

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\* 3. Bacon's Works, 526, Am. ed.



as the trades. He knew that the general cause of winds was the action of the heat of the sun upon the moisture or vapors that arise from the earth, and appears to have had a general idea of the influence of heat and cold upon their movement without exactly reaching the general scientific truth that wind is a current of air in the atmosphere, ordinarily caused by the inequality of the temperature of adjoining regions.\* He frequently speaks of the nurseries of the winds in the clouds, or otherwise around the globe, which generate and send them forth; but he was not very clear on this point, nor with regard to the direction of the winds; for his want of knowledge of their deflection from their original line, with respect to the surface over which they blow, by the rotary motion of the earth, made much that he had to say about the causes of the direction and movement of winds of very little value.

It was otherwise with Bacon's great contemporary Des Cartes, whom Hallam calls "the pride of France and the wonder of his contemporaries," for Des Cartes was an excellent mathematician and a good astronomer, who considered that Copernicus had absolutely demonstrated the correctness of his theory of the movement of the earth. Taking that for his foundation, Des Cartes wrote a work upon the physical history of the earth which he never published, or even showed to his friends, when he found after its completion, that Galileo for maintaining the Copernican theory had, by order of the Inquisition in Rome, been thrown into prison and compelled to sign a document abjuring his belief in that theory. Des Cartes in writing to a friend in 1633 says, after hearing of Galileo's

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\* Cooley's *Physical Geography*, p. 163.



condemnation, that he had almost resolved to burn his papers, or to let no one see them. "If," he says, "the idea of the movement of the earth is false, then the whole foundation of my philosophy is false, for it is so bound up with all the parts of my treatise that I should not know how to detach it, without making all the rest defective. But as I would not, for anything in the world, that any discourse should proceed from me, in which there should be the least word disapproved by the Church, I prefer rather to suppress my work than that it should appear limping and defective"; and he did suppress it.

In the same year, 1633, he published his *Meteora*, a name then used for atmospheric phenomena, from which he carefully excluded any reference to the movement of the earth, but, on the contrary, inserted a passage to the effect that the entire atmosphere moved around the earth from east to west; which, as I interpret the passage, for it had no necessary connection with the subject that he was then treating, was done to satisfy the Church, as it left upon the mind of the reader the impression that the earth was immovable, without the author's absolutely asserting it.\*

In this work he investigates the nature of the exhalations and vapors drawn up from the earth by the heat of the sun in producing clouds, winds, rain, hail and snow. Every sensible agitation of the air he regarded as wind; holding that the winds arise from the difference in the nature or constitution of vapors and the irregularity and variety of the surface of the earth over which they blow, for at sea, he says, where there is no irregularity, they blow more regularly and are stronger. Snow, he thought, was formed

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\* See Appendix.

in the clouds by the cold acting upon the upper surface of the vapors, and that storms and tempests were due to the clouds descending rapidly and driving the air with such force before them as to create a great wind. He considered that thunder, lightning and whirlwinds had their origin from many layers of clouds being disposed one over the other, like stories in a house, and were produced by the upper layers falling with great violence upon those that were below ; and he appears in this treatise to have been the first to explain the cause of the rainbow. He considered, also, the subject of the ebb and flow of the sea, and supposed he had found its explanation in his theory of vortices, which, however, failed to solve the problem, and need not be dwelt on in this place.\*

A few years after the death of Des Cartes, Du Hamel, a writer in his day of considerable authority upon scientific subjects, published in 1659 a treatise upon atmospherical phenomena in the form of a dialogue between three persons, Theophile, a zealous believer in the ancients, Menander, a passionate partisan of Des Cartes, and Simplicius, in whom Du Hamel personified himself, who adopts the side of neither, taking, as he professes, from each what he considers the best. The author in so doing and in the general carrying out of his plan showed himself rather unfavorable to, or at least inappreciative of, the views of Des Cartes.

There was nothing connected with atmospherical phenomena that interested scientific men in the seventeenth century more deeply than the subject of the winds. This was due to the opening up of a large

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\* See Appendix.

portion of the globe during the age of maritime discovery, which made men familiar with the disastrous tempests, hurricanes, cyclones and other disturbances that are so frequent in the equatorial and southern seas, and also the fact of the trade winds and monsoons, a correct knowledge of which was then highly important for the purposes of navigation. The question, therefore, of the origin of the winds, the cause of their movement and their direction was one of great practical value, the investigation of which had not been confined to Bacon and Des Cartes, but had been written upon by Galileo, Fournier, the French geographer, Riccioli, the Italian geographer, Kircher, the mathematician, physicist and naturalist, Boyle, the philosophical chemist, Isaac Vossius, the son of the historian, and others; but the most useful contribution during this period to this important inquiry was a small volume by R. Bohun, of New College, Oxford, entitled a "Discourse upon the Knowledge and Properties of Wind," which he published at Oxford in 1671. The references that Bohun makes throughout his book show that he was thoroughly well informed of all that had been advanced respecting the winds from Aristotle to the writers of his own period. He had not much respect for the opinions of the ancients, or for assertions which he said had "been long received by the world from the great reputation of their authors"; and he especially refers to those which had been set down by Aristotle in his *Meteors* and *Book of Problems*, pointing out that Bacon, in respect to the qualities of the wind, had followed exactly in the traces of Aristotle. "The world has been so long imposed upon" says Bohun, "by traditions, that we must in the

first place be thoroughly informed upon all matters of fact to ascertain what hypothesis facts will justify, which must be the result of long experience and observation, for a full collection of the properties and effects of wind must be the work of posterity and may require many ages. I have, therefore," he says, "taken a larger compass than the generality of writers and derive the origin of the winds from several causes which I have rather endeavored to prove from accounts of sea voyages and relations of matters of fact, than to refine on them by any nice speculations of my own." He had, for the time, a very clear conception of their cause, of the condensation of vapors by cold, and the rarification of them by heat, and he gave in his work a considerable amount of useful information that he had collected from shipmasters, especially respecting the trade winds and monsoons, as well as about tornadoes, cyclones and other atmospherical disturbances. He neither admitted nor denied the Copernican theory, and the defect in his book is that he prefers to rely upon such reasons as will accord with the belief in the earth's immovability. He earnestly urged that shipmasters, especially those who made long voyages, should be required to keep a record of their observations that might be available for investigation and comparison; a plan which the United States Coast Survey, two centuries afterwards, adopted to get information respecting the winds and oceanic currents by what are known as Maury's charts.

With the exception of what may have been done by Des Cartes, and that was not given to the world, no attempt was made to arrange and systematize the large

amount of physical information respecting the earth that had been gathered in the age of maritime exploration, to make use of this new material as a whole and show the results that it warranted, until 1630, when Bernard Varen, a physician of Amsterdam, better known by his Latin name of Varenius, published in that city his *Geographia Generalis*, a work so original, and so unlike anything that had preceded it, that it brought about a new era in the study of geography. He was the first to separate what he called general or universal geography from that which is special or particular; meaning by general geography all which relates to the earth as a whole, and by special or particular geography, the description of countries, and what was peculiar or incident to them. It was not a treatise wholly relating to physical geography, for a large part of it was devoted to what was mathematical, together with other things, such as the art of navigation and the building and loading of ships. The larger portion of it, however, contained what now comes under the head of physical geography, and was remarkable at that time for the extensive and accurate information which Varenius had of the earth's surface and of physical facts relating to it, much of which was not then to be found in books, and must have been obtained by him from shipmasters, merchants or others in Amsterdam, or in records of voyages kept there and in other Dutch cities; for Amsterdam was at that time a great sea-port, which, together with other towns in Holland, maintained an extensive commerce throughout the world, and sent out maritime expeditions to remote or unknown parts in order to open up new sources of traffic.\*

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\*Holland at this period possessed nearly half of the merchant marine of the world. Émil Michel, *Revue des Deux Mondes*, t. 96, liv. 4.



In the log books kept during such voyages would be found everything new that had been observed respecting winds, currents and many other matters that were useful in navigation or important for the purposes of trade, and the enterprising and enlightened merchants that sent out these expeditions would, after these voyages were over, preserve the log books, as what they contained would be of use in further adventures. To this source of information Varenus undoubtedly had access, and the admirable use he made of it appears in the general plan of his book and the way in which it is worked out.\*

The work deserves a more detailed exposition of its merits than it is possible to give in an address of this nature. It will be sufficient to say that it attracted the attention of Sir Isaac Newton, who thought so highly of it that he caused it to be reprinted in England, that he might use it as a text-book in his own lectures upon the same subject. It was afterwards translated into English and as translated passed through several editions, and was reprinted in other countries. For a century and a half it was a work of authority in universities and among the learned, and though, during that long period, many geographies were published, nothing of the same breadth and scope was produced† until 1817, when Karl Ritter published in Berlin, the first volume of his great work, *The Science of the Earth in its Relation to Nature and to the History of Man*; a work that during his long life was augmented to nineteen volumes, eighteen of which

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\* See Appendix.

† Exception must be made of Kant's remarkable lectures on Physical Geography, always a most interesting subject to him. These lectures were edited during his lifetime by his friends and pupils, and undoubtedly prepared the way for others. (See Appendix.)



are devoted to the continent of Asia alone. This work, from the very beginning, raised geography to a higher plane than it had ever occupied before, by disclosing the relation it had to the condition of man, the formation of nations, and the development and progress of civilization. Ritter, as he has said himself, studied geography as the physiologist and the anatomist study the human body, that is, by a careful and thorough investigation of the different parts to get at a better understanding of the unity and general purpose of the whole. To Ritter, every marked peculiarity upon the earth's surface had its function. The height of mountains and the distribution of mountain ranges, the great elevated plateaus, the sweeping valleys, the vast level plains, the arid deserts, the coast lines and situation of continents and of islands, the distributions of oceans and seas, and the great ice-bound regions at the poles, all had their appropriate functions as part of the general organism of the earth; and this being specially adapted for the abode of man, its geographical features had a direct influence, not only upon his material state, but in the bringing out of his moral and higher faculties: for Ritter was a profoundly religious man and saw, in the enormous body of facts that he had investigated and brought together, an arrangement, made by one great directing mind, that was wonderful in its wisdom, and but imperfectly understood by man.

But the carrying out of a scheme so widespread as this, was not one to bring about such a practical work as the establishment of a science of physical geography. This required a mind very different from that of Ritter. It demanded a man who could bring together the mass

of material that had accumulated since the days of Varenus, for during that long period several new sciences had been formed, and so arrange and present all that was then known of terrestrial physics as to lay the foundation for a distinct and separate science, and that man was found in Ritter's contemporary and life-long friend, Alexander Von Humboldt. I doubt if any man ever existed that had so great an amount of exact and positive knowledge as Humboldt. He was a specialist in six sciences : geography, geology, meteorology, physics, botany and zoology, and beyond this he was a generalizer of a high order, such as the world had not seen since the days of Aristotle.

When I met him in 1851, in his small apartment at Potsdam, he was seated at a table, drawing, as he told me, from memory, the outline of the Peak of Chimborazo, being dissatisfied with an engraving of the mountain in a work that had just been sent to him. I mention this incident to show how vividly the physical features of nature impressed him, and how enduring was his recollection of them.

In 1827 Humboldt delivered at Berlin sixty-one lectures on physical geography, five of which were devoted to its nature and limits, and by these, I may say, the foundation for that science was laid. The other lectures were upon special branches, such as the nature of the surface of the earth, the sea, mountain forms, volcanoes, earthquakes, the distribution of heat, terrestrial magnetism and the geographical distribution of plants and animals. These lectures were largely attended by the most learned and distinguished men in Germany. They created a great sensation at the time and drew

general attention to the subject throughout Europe. One of the results was the publication, by Berghaus in 1832, of the first part of his physical atlas, a work that was completed in 1837. This pictorial aid was of great value, for upon these beautiful charts the eye can take in at once what it is often difficult to convey by words ; and in connection with this should be mentioned the researches of Professor Dove of Berlin, the meteorologist, upon the laws of climate and other matters relating to atmospheric phenomena.

There remained one thing more to be done. Humboldt did not publish his lectures. He kept them to be used many years afterwards in the preparation of his *Cosmos*, although others published notes of such parts as they had taken down. What was required, therefore, was that some one should collect all the facts that were then known and arrange them systematically in a treatise that should present a view of the whole subject, and this was done by F. Hoffman, who published in 1838 his "*Physikalische Geographie*."

In 1848 Keith Johnston published his great physical atlas, and in the same year appeared Mrs. Somerville's *Physical Geography*, which presented the subject to English readers in a most attractive form, for this lady was not only distinguished for the extent of her scientific knowledge, but, like Ritter, she had the rare art of making scientific matters plain to the ordinary reader by her admirable arrangement of the subject, and the clearness and felicity of her style. I know of no work within the same limits that has a great amount of valuable knowledge so perspicuously set forth and so admirably arranged, a characteristic to be found also in



HUMBOLDT



her former work on the Connection of the Physical Sciences ; and as my paper will close with this interesting lady, I may add that, in addition to her great scientific attainments and labors, she was distinguished for the physical beauty of her person, her gentleness, the charm of her conversation, and her truly feminine character in all the relations of daughter, wife and mother. I may add in conclusion that, like Ritter, her scientific researches strengthened her belief in the great truths of Christianity, to which she steadfastly adhered and from which she derived the greatest consolation, as she frequently declared, up to the end of her long life at the age of ninety-two.

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## APPENDIX.

### ARISTOTLE.

Aristotle's theory of the winds is that there is a two-fold exhalation from the earth, the vaporous and the fuliginous, rain being generated from the vaporous and from the fuliginous wind. The moist, he affirms, is not without the dry, nor the dry without the moist ; the two are mingled with each other, and contribute to the generation of each other.

The sun, being moved in a circle, at one time becomes northern and at another southern.

When he ascends he raises moisture from the earth and evaporates it ; but when he becomes southern, or declines, the vapor becomes thickened and is changed into water, and, falling on the earth, moistens it and the earth returns the fuliginous exhalation, like moist wood. In this way the exhalations generate each other.

There are four universal winds. Two of these, Apeliotes (the East) and Zephyrus (the West) are milder winds ; but the north and the south winds are violent.

The cause of this violence is that the sun does not heat the poles which are cold and moist.



Much rain being produced at the poles, much fuliginous exhalation ascends; and therefore the north and the south winds are vehement.

Winds are not so strong in the middle sea as near the shore, where the fuliginous exhalation rises; and on the tops of the highest mountains the air is tranquil.

The oblique motion of winds is explained in this way: all the air in the upper parts follows the motion of the universe, and the fuliginous exhalation, ascending as far as to the air and not being able to pass beyond it, vibrates to the downward parts and the winds become oblique.

Earthquakes are produced by causes similar to those which generate the winds. The earth is dry, but receives by rain much humidity, and, being heated by the sun and by the inward fire in itself, much spirit is produced both within and without, and the whole of this flows at one time inward and at another time outward. Spirit, being the most attenuated of substances, moves with the greatest celerity, and is on this account especially percussive and motive of bodies.

Thunder and lightning are extruded by compression from clouds, these being most condensed in the upper part, because of the cold, so that the thunder and lightning tend downward to the earth.

(Taylor's Aristotle, London, 1806-1812.)

#### DES CARTES.

The passage in the original is as follows: *Sed jam speciatim proprietates & generationem principum ventorum contemplemur. Primò observatur, totum aërem circa terram ab Oriente ad Occidentem volvi: Idque hoc loco supponendum erit, cum commodè ratio diduci nequeat, quin totius universi fabrica simul explicetur; quod extra nostrum propositum.*

(Renati Des Cartes *Specimina Philosophiæ*, etc. Amstelodami, 1656, p. 175.)

*Translation*—"But let us now consider particularly the properties and the generation of the principal winds. First, then, it is remarked that the whole atmosphere revolves (is revolved) around the earth from the east to the west: and this will have to be admitted in this place, because the reason for it cannot properly be set forth without explaining at the same time the fabric of the whole universe; and this is foreign to our purpose."

William Wallace in an article in the *Encyclopædia Britannica* gives this explanation of Descartes' theory of vortices:

The infinite universe is infinitely full of matter. . . . As the movement of one particle in a closely-packed universe is only possible if all other parts move simultaneously, so that the last in the series steps into the place of the first; and as the figure and division of the particles vary

in each point of the universe, there will inevitably at the same instant result throughout the universe an innumerable host of more or less circular movements, and of vortices or whirlpools of material particles, varying in size and velocity.

## KANT.

Prof. R. Adamson, in the *Encyclopædia Britannica*, ninth edition (*art. Kant*), enumerates as among the most important of Kant's contributions to physical science: 1. The tract, *Whether the Earth in Its Revolution has Experienced Some Change Since the Earliest Times* (1754). In this tract it is pointed out that the action of the moon in raising the waters of the earth must have a secondary effect in the slight retardation of the earth's motion, and the fact that the moon turns always the same face to the earth is referred to a similar cause: 2. *Explanatory Remarks on the Theory of the Winds* (1756), in which Kant observes that the varying velocity of rotation of the successive zones of the earth's surface furnishes a key to the phenomena of periodic winds; a theory that is in almost entire agreement with that now received.

## VARENIUS.

The originality and value, at the time, of Varenus' work, will be more fully appreciated when it is compared with the best geographical work that preceded it. This was Cluverius' introduction to general geography, the first edition of which was published in Leyden only twenty years before the appearance of Varenus' work and which, in the course of a century, passed through twenty-six editions, a remarkable thing at the period for any book. This geography was a great improvement upon its predecessors, because Cluverius discarded all the imaginary and absurd things that had deformed previous geographies from the time of the middle ages and confined it to what the author believed to be accurately known, and yet this popular geography had comparatively nothing respecting the physics of the earth beyond the statement that it was round, that the winds were named after the 32 points of the horizon, and a brief statement respecting the ocean; his general idea of which was erroneous, for Cluverius adhered to the Ptolemaic theory and believed that the earth stood immovable in the centre of the universe. In fact a few pages embraced nearly all that could be said to relate to physical geography, to which subject Varenus devoted nearly the half of his work.

In his first six chapters Varenus gives an admirable exposition of what geography is, after which he divides his book into sections, every section containing a number of geographical propositions, each proposi-

tion followed by a statement of the reasons and facts that support it. He considers the changes that have taken place in the earth's surface and the causes of them ; how the ocean has in certain parts usurped the land and the land in others has encroached upon the ocean. He inquires into the origin of mountains, their rise and depression, why rain gathers around their tops, and gives a description of the principal ones and of volcanoes. The subject of the waters of the earth is extensively examined, from the ocean to natural fountains and mineral springs. He rejects the prevalent belief that the Pacific Ocean is higher than the Atlantic and the Indian Ocean higher than the Mediterranean, maintaining that by physical laws the ocean is of a uniform level throughout, and that there is no foundation for the statement of certain writers that if a canal were cut through the Isthmus of Suez the waters of the Southern Ocean would overflow the whole of lower Egypt. He expresses the opinion that such a canal is entirely feasible, and that this should have been asserted by him two hundred years before the canal was constructed is interesting, when it is remembered that up to the time when De Lesseps began the work of it engineers insisted that it was not practicable, in consequence of the inequality of level between the Mediterranean and the Indian Ocean.

He devotes a chapter to the subject of rivers, the causes that affect their form, their direction, the rapidity or otherwise of their course, the source of their supply and the general office they perform ; pointing out the erroneous opinions the ancients had respecting them, especially as to the cause of the periodical rise of the Nile, which he correctly ascribes to the existence of great lakes and the mountains in the vicinity of the equator, and explains why the rise of the river begins and ceases at particular times. But the most interesting investigation he makes in connection with the movement of waters is as to the cause of the ebb and flow of the sea. He reviews the various opinions that had been advanced to account for the regularity of this movement, from the time of the ancients, such as the views entertained by some that the earth and sea were of the nature of a living creature, which by its respiration, caused the ebbing and flowing ; of others, that it came from a great whirlpool near Norway, which, during certain hours, absorbs the water and afterwards discharges it in the same space of time. He rejects the theory of Scaliger, which, as stated in the text, was that of Bacon, that the motion of the sea was obstructed by the two hemispheres of the Old and the New World, and reverberated. He considers the cause assigned by most philosophers, that it was owing to the influence of the moon, but he says the question is, what is this influence, and they answer that it is an occult quality, or sympathy, whereby the moon attracts moist bodies ;

which, he continues, are mere words signifying that the moon does it by some means, but they do not know why, which is the thing we want.

After reviewing the various reasons assigned, he thinks Des Cartes' explanation of it by his theory of vortices to be the most ingenious, but points out defects in his demonstration which make it contrary to experience, and finally comes to the conclusion that the moon some way or other causes this motion, that the flux is produced by the pressure of the moon, or the celestial matter between it and the sea, and continues no longer than the cause that forces it,\* which was about as near to the truth as it was possible to get until the discovery afterwards, by Sir Isaac Newton, of the law of gravitation.

Other subjects reviewed by him are the difference of climates and their cause, the causes of light, heat, cold, rain, etc., and the particular effect of the obliquity or perpendicularity of the sun's rays. The atmosphere is a subject that is especially dwelt upon, and its composition and nature are explained as accurately as the scientific knowledge of the time would admit. As the heat from the sun expands the vapors, he says, they require more room, and as the heat leaves them they require less, and that it is this constant change and interchange, this expanding and contracting that causes the winds, wind being merely a movement of the air; a motion that can be felt and that has force. He rejects the view entertained by some that the movement or commotion, as he calls it, is towards some particular point, as some are circular, and no wind exactly observes the same point, though there are particular or prevailing winds. The general cause, he holds, is the heat of the sun, which rarifies and attenuates the air, causing it to take up more space and press forward the air that encompasses it. That exhalations come from the land as well as the sea, but do not cause wind until they are rarified by the sun's heat, and that other causes are the melting of the snow upon high places and the descending and pressure of clouds from above. He explains the cause of the monsoons, and he gives many facts that he had collected respecting the winds and other atmospheric phenomena; and then follows a very full, accurate and practical exposition of mathematical geography, which takes up a large part of the work.

Until very recently little was known respecting Varenus beyond the fact that he was a physician in Amsterdam, and published his works in that city. It has now been ascertained that he was born in 1622 at Hitzacker, on the Elbe, in Hanover, that he passed his early life at Uelzen, where his father was court preacher to the Duke of Brunswick, that he studied at the universities of Königsberg and Leyden, and went to Amsterdam to practice physic, and died there in 1670.

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\* Varenus by Duydole, 236, 254.

## THE TIDES.

E. A. Wallis Budge in his *Babylonian Life and History*, page 145, mentions a Babylonian tablet found in 1883, upon which is an account of the contest between the great she demon of the sea Tiamat and Merodach the Lord of life and light, the mythical conception, as stated in the text, of the struggle between light and darkness, in which, he thinks, an early reference is made to the tides; that is, that "while the fight was going on she (Tiamat) apparently stopped the tides from flowing," which the God Merodach who conquered her rectified.

Strabo B. III. c v. § 9, says upon the authority of Posidonius, that Seleucus, a native of the country adjoining the Persian Gulf, states that the regularity and irregularity of the ebb and flow of the sea, follow the different positions of the moon in the zodiac; that when the moon is in the signs next the tropics, the tides are irregular both in their height and force, and that for the remaining signs their regularity is greater or less, according as they are more or less removed from the signs before mentioned.

Cæsar in the fourth part of the Gallic War, c. xxix, noticed that when the moon was full, "the maritime tides were greatest in the ocean," and Seneca, B. C. 38, speaks of the moon attracting the waters. This conception on the part of Seneca of what is the modern explanation of the principal cause of the regular action of the tides, the moon's attraction, is not so striking in his case, as he was a man of remarkable geographical insight, who was not only convinced of the globular form of the earth, but had the farther conception that what was then recognized as the only inhabitable part of it was inadequate to account for the amount of land that must exist in the same wide circle of the globe and that a great land would be revealed in the future upon the opening up of the ocean at the west; which appears in a passage in his tragedy of *Medea*, and although this passage has frequently been referred to by geographical writers, it may be appropriately given here, being always of interest as foreshadowing the subsequent discovery of Columbus. It is in these words:

"There will come ages, in the future years, in which the ocean may loosen the bonds of the universe and *a great land may appear* and the *sea may reveal new worlds* and there may be no *ultima thule* on earth."

## EARLY EGYPTIAN KNOWLEDGE OF THE REVOLUTION OF THE EARTH.

Miss Edwards, since the delivery of the Address, has kindly given me the authority for the statement made in her lecture referred to in the text.



Ptah, the primordial god, is said, in the great Harris Papyrus, to have "moulded man, created the gods, made the sky and formed the Earth, *revolving in space*. (Great Harris Papyrus, translated in the *Records of the Past*.)

Professor the Rev. G. Lieblein, in a paper read before the Congrès Provincial des Orientalistes at St. Etienne, and printed in the Report of its Proceedings, quotes from a hieratic inscription of the Pyramid period the following passage: "The Earth *navigates* the celestial ocean in like manner with the sun and the stars."



## ENGLAND TWO HUNDRED YEARS AGO.

A REVIEW BY PROF. PAUL CHAIX, GENEVA, SWITZERLAND.

*Through England on a side saddle in the time of William and Mary, being the Diary of Celia Fiennes.* Edited by the Hon. Mrs. Griffiths. Field and Tuer, Leadenhall, London, 1889. (*Privately Printed.*)

The writer of this Diary was the daughter of Colonel Nathaniel Fiennes, a Parliamentary officer, and was sister of the third viscount Saye and Sele. She lets us know that "her Journeys were begun to regain her health by variety and change of air and exercise, and wrote down her remarks not likely to fall into the hands of any but her near relations, there needs not much to be said to Excuse or recommend it, being well aware of its *defect* in all, so they will not expect politeness in this book, only insisting on the opportunity of having many imitators among such gentlemen who are reckoned apt to perform the duties of magistrates and members of parliament in the gen<sup>l</sup> service of their country, and would not be the worse for having studied their own country as she has done for diversion."

The editor, the Hon. Mrs. Emily W. Griffiths, herself a kinswoman of Celia Fiennes, being a daughter of the present 13th baron Saye and Sele, says in an Introduction that she copied the MS. verbatim because she believes any alteration would spoil its quaint originality.

We are indeed inclined to ascribe to the writer worse than mere quaintness. When we bear in mind that she was a contemporary of Madame de Sévigné, we are sorry to acknowledge that the fair sex in England was a step behind that of France, a defect amply redeemed in our present time.

There is but one date mentioned in Celia Fiennes' MS., namely, 1697. Another clue to its chronology is the description of Queen Anne's coronation and the frequent mention of William and Mary as sovereigns entitled to the gratefulness of the nation. She speaks of the metropolis as knowing it well, and allows us to guess that her regular residence was Newtontony, eight miles from Salisbury (Wiltshire).

The Diary opens with a description of *Sarum* or *Salsbury*, rebuilt after the destruction of Old Sarum by fire, on a low ground irrigated by "a little rivulet of water which makes the streetes not so clean or so easaye to pass in." "The cathedral, notwithstanding its want of a Rising ground to stand on y<sup>e</sup> steeple is seen many miles off.—The top of the Qoire is exactly painted, and it looks as fresh as if but new done though of three hundred yeares' standing.—There is many good monuments there one all free stone for the lord Georg (name untold), his effiges and ladyes att length on a bed in their Robes and ruffs on pillows, and y<sup>e</sup> four pillars are twisted and over it Angels, figures of birds, beasts, flowers and leaves very fine, there sits Justice w<sup>th</sup> y<sup>e</sup> ballance in her hand, one scale laying over the other twisted looks very natural and well, with y<sup>e</sup> wreathed work all in free stone with their Armes cut about in Escutcheons all about it ; the other is a monument for the Duke of

Summerset all in marble, a large bed his Effgee in garment and ruff all in Coullours, his lady the same only she is laid one step above him because she was Daughter of the Dowager of ffrance (Mary Tudor, the widow of Louis XII) and sister to Henry y<sup>e</sup> 7<sup>th</sup> (8<sup>th</sup>) of England by her second husband Charles Brandon Duke of Suffolk.—There is the effgee in stone off a doctor that starved himself to death attempting to imitate our Saviour to fast 40 dayes—but at 31 dayes end he became sensible of his evil and would have retrieved his life by eating againe, but then by the Just judgment of god could not swallow any thing down his throate.”

So much for the author's style, a contemporary of the Princess Palatine, of the *Grande Mademoiselle* of Orleans-Montpensier and of Madame de Sévigné. She takes us hence, a distance of three miles, to Wilton, “a little village only supported by the Earle of Pembroke while lives there and has a very ffine house with large Courts one within another.—there is a drawing roome with Anti-roome, y<sup>e</sup> wanscoat is painted with the whole History of the *Acadia* romance made by S<sup>r</sup> Philip Sidney, brother to y<sup>e</sup> then Countess of Pembroke and Composed by him in y<sup>e</sup> fine woods above y<sup>e</sup> house.” Then follows a minute description of that lordly residence and its outhouses with especial tribute of admiration to the recurrence of the childish trick of aspersing the earl's guests with “showers of rain all about y<sup>e</sup> rooms,” the table, in grottoes and even to the entrance of their bedroom.

The continual recurrence in the description of the inner parts of mansions of the word whainscoting under the old shape of whanscoating puts us in mind of the

German word Wand, a wall, as the possible etymology of the now adopted word. In her prodigious and really confused minuteness of description of railings, courts, outhouses, stables, stairs, hangings, tapestries, yards, closets of all descriptions and carpetting, she names but once a "parlour for smoaking," and but once also the illustrious authors of the numerous collections of *fine paintings* adorning the mansions she has visited. Sir Godfrey Kneller is mentioned as the author of many portraits of the ladies who had adorned the court of Windsor.

Her description of Bath in the first pages (12) of the Diary gives us a faithful and complete picture of that place of resort, quite as fashionable in 1695 as it is now, but where the bathers had not yet been subjected to the code of *Beau Nash*. Their manners, then much the same all over Europe, put us in mind of the rather slovenly baths at Louèche. Miss Celia Fiennes was once a witness of much municipal pageantry in the town of Bath, and gives us a full account of the festivals which put a whole population in motion. She is all along partial to descriptions of the watering places, which she calls *spaws*, spread all over England, many of which have now fallen into neglect and oblivion; she speaks of them as a customer, and fully describes the manner of bathing or drinking those mineral waters. She does full justice to Tunbridge (p. 102), Harragate (Harrowgate) (p. 69), Marsborough (Knaresborough), as well as to Alford (p. 11), Horwood in Buckinghamshire (p. 22), Astrop "steel waters," (p. 25), Barnet (p. 99). By a curious contradiction a chapter at the end of her Diary under the head of "Epsome," mentions every place in Surrey ex-

cept Epsom. Her first journey, limited to a few of the southern counties of England, enabled her to describe Winchester, to which she does ample justice, without, however, mentioning the events of which it was the theatre. The ancient abbey of Beaulieu, in the New Forest, called by her Bewley, is scarcely mentioned; but the duties and especially the perquisites of all the keepers and rangers of the New Forest are given at length. She thence crosses to the Isle of Wight, where Carisbrook Castle is mentioned (p. 41) as the "retreat" (not as the prison) of King Charles I. "when he was worsted by Parliaments forces."

The description of the modest and quiet town of Chichester (p. 30) would be deemed exact to this day, with its four streets meeting at the gothic pile called the *Cross*, a most elegant structure, which seems to have been a very common ornament of most of the English cities. But the author says (p. 29) that the market cross at Abington (Berkshire) "is the finest in England, its all of free stone and very lofty," a compliment, however, which she pays to several other more northern cities. She gives Chichester estuary credit for lobsters and crabs whose glory is long gone, and to its Gothic cathedral for a tower ascended by 260 odd steps, and for "severall effigies of marble and allabasters of the bishops of the place and one of the Earle of Arundell and his Lady." She says she "went through more of Sussex w<sup>ch</sup> is much in blind and dark Lanes and up and down Steepe hills, through Arundell parke, belonging to the Duke of Norfolk," a rather erroneous account. She mentions also in the neighborhood of West Sussex a gentleman's house praised "for the great number of yew trees cutt



close in several green alleys," a feature which might be identified in the neighboring park of Goodwood, save for the unimpaired beauty of its trees.

If she is liable to blame for her unexplained silence about Arundel Castle, the famous seat of Roger de Bellesme, baron of Montgomery, Celia Fiennes makes amends by indulging in minute descriptions of insignificant mansions provided they be "new and neat," and we will, at the risk of being tedious to the reader, pick out (p. 23) a few pages on Sir John St. Barbe's insignificant mansion at Rumsey, 6 miles from Southampton: "You enter a Court that's wall'd in and blew Iron gates. The Court has a round in the Middle rail'd in, designed for a Bowling Green, and the Coaches drive round it to Come to the Entrance w<sup>ch</sup> is severall stone steps to a Broad Space that is rail'd w<sup>th</sup> Balls and Banisters: the Space is paved with broad free stone the Stepps the same 8 or 10. The house is a halfe Roman H. Y<sup>e</sup> hall is in the Middle w<sup>th</sup> double doores, its very lofty and large ther's a Chimney just against the Entrance on the Right hand, runns in an Entry through the house to the back yard, where are the offices. Still house and Barnes and Coach houses and a very fine Stable built of Brick—there are large partitions. In this Entry you have the pantry and Cellars and on the other side y<sup>e</sup> Kittchin Larders and pastry w<sup>ch</sup> is one wing of the house and just behind the hall is y<sup>e</sup> Servants hall and a Little parlour just by the pantry and back stairs. Then the great hall is divided in halfe by the staircase, w<sup>ch</sup> hangs on its own work not supported on Either side, to the first half pace and all the way up without Support, on the one Side they are of oake, the railes and



banisters are varnished. The halfe paces are Inlaid with yew wood w<sup>ch</sup> looks a yellowish red . . . .” The reader will forgive us for stopping here to draw our breath, although we are depriving him of two more pages of this style, and of an endless enumeration of more rooms, parlours, stairs and backstairs, of closets, velvet hangings, screens, dining-rooms, kitchens, gardens and kitchen gardens, garrets and waterworks, of spouts all mingled together in unutterable confusion with full display of the author’s wonderful powers of sight and observation. She passes unnoticed such places as Pomfret, Warwick Castle and the ruins of Kenilworth, and the names of those who have dwelt within their walls. It might be expected that a lady living in affluence, such as allowed her to spend her leisure in so much travelling, would have qualified herself for the laudable task she had assumed by a study easier in her time than it is to us. But we must make up our mind to acknowledge that in her architectural notions, no building was worthy of admiration that was not stamped with the then prevailing style of the ill-named *Renaissance*, which she calls the *London manner*, and that she would have lent her hand to pull down what survived of those remnants of the Middle Age, which we now admire and which had recently undergone the consequence of the civil wars, and the heavy hand of Cromwell and Waller’s fanatical soldiers.

In her excursion to Corfe Castle and the so-called *Isle* of Purbeck in Dorsetshire we read a description of the works at some copper mines now exhausted, and of the process used to convert the ore into copperas like “sugar candy.” The author always seriously attends

with better success to explanations of industrial matters. Her description of the Stoneage or Stonidge (Stonehenge) "one of the wonders of England that stands on Salsebury Plaine," leads to the mention of some similar megalithic remnants of less note, such as the "Mottstones that stand by the sea-side in the Isle of Wight," (on the south-west coast) and at Rowle-stone near Brampton, a few miles west of Oxford "where are many such great stones."

Oxford is described at great length (p. 24-29) and not without interest, in a way that allows us to make a comparison with the present state of that sanctuary of learning. The writer does full justice to the pleasant site of the city and to the particulars of its 18 colleges and 6 halls, inasmuch as she claims William of Wickham, the founder of the New College, as one of her ancestral kinsmen, and was very handsomely entertained there, the number of the Fellows amounting to about one hundred. She praises the beauty of the theatre located in the middle of the colleges, two of which were called the Devil and Belial (Baliol) colleges. The first rank is ascribed to Christ Church College, and "in one of the Courts is a tower new built for to hang the *Mighty Tom*, that bell is of a large size, so great a Weight they were forced to have engines from London to raise up to the tower." Miss Fiennes confesses that the Library occupying 2 or 3 rooms "is old and a little disregarded.—There was a very odd custom In Queen College, for every New Years day to give to every Gentleman fellow of the College a few needles and thread with these words: Take this and be thrifty."

A number of pages (99-114) are employed in an

account of her *Journey to Canterbury and Dover*. She there mentions a ferry across the Thames then existing between Gravesend and the fort of *Tilberry* where “the Thames was very Rough and Deep, the Boy was then afloat on the Nore”; and while crossing the Medway at Rochester she gives it the title of “the finest River she ever saw.—The Bridge at Rochester is the finest in England—nay its said to equal any in the world—it is not built upon with houses as London Bridge but it is very long and fine with nine large arches.” There is no mention, however, of the dock-yards and naval establishment at Chatham and Sheerness. Her full description of the cathedral at Canterbury is completed by that of an underground chapel: “Under the cathedrall is a Large Church just like S<sup>t</sup> Ffaiths under S<sup>t</sup> Pauls in London; this is given to the Ffrench protestants in the town for the worshipping God, it holds a vast number of people, its so well arched that they cannot hear them in the cathedrall when singing.” Canterbury was indeed the seat of a numerous colony of French refugees who had introduced manufactures of silk in a prosperous state, where she saw many “loomes working severall fine flower’d silks.” To the same origin was due the working of “paper mills w<sup>ch</sup> dispatches paper at a quick rate, they were then making brown paper w<sup>n</sup> I saw it. The mill is set a going by the water and at y<sup>e</sup> same tyme it pounded the rags to mortar for y<sup>e</sup> paper, and it beate out meale and Hemp and ground bread altogether.”

Then follows an accurate description of Dover and all the Cinque Ports on the Straits of Dover, of *Warworth* (Walmer) Castle, since the official residence of the Duke of Wellington, of Dover Castle “standing on the Edge

of a very steep hill on w<sup>ch</sup> you ascend up to y<sup>e</sup> tower 120 steps, whence you discover Callice (Calais) in Ffrance, in some Clear Dayes towards the evening you may see the towers and buildings of Callice." Crossing two arms of the sea now silted up, she entered the Lybertys of Winchelsea which stands on a hill. "Remaines of Churches and Halls are to be seen but Else grass grows now where Winchelsea was. There are but a very few houses now, but its y<sup>e</sup> ancientest corporation in England, so y<sup>t</sup> should Lord Mayor of London meete M<sup>r</sup> Mayor of Winchelsea he must give him place: it was as flourishing place before the sea Left it that was in England."

The account of Miss Fiennes' journey to Canterbury and Dover, is completed by a full description of the hop-yards, the fruit and eatable products of that fruitful county, of the mineral waters of Tunbridge Wells (which she "dranke many years with great advantage"), of the way they are used by patients, of the "many good buildings and Lodgings that makes them very Cheape, Shoppes of all sorts and full of toys, Silver, china, milliners, curious wooden ware were numerous. There were also severall good taverns at the walks and all about to supply good wine and Brewhouses for beer and Bakers for Bread."

Then comes mention of Dorken (Dorking) in Surry where are the best trouts in the river, and she closes by merely summing up (p. 108) the number of miles she has travelled, amounting to 1045; and this seems to have been her principal care and aim.

The page 48 begins with the following words: *Here begins my northern Journey in May, 1697*, a title which however, leads the reader to the Eastern Counties of

England, setting out with "Andly end (Audley End) a house of the Earle of Sussex w<sup>ch</sup> makes a Noble appearance Like a town so many towers and buildings off stone within a parke w<sup>ch</sup> is walled round. The roomes are Large and Lofty with good Rich old ffurniture tapestry, but No beds in that part we saw. There are 750 (150 ?) Rooms in the house."

Epping is passed unheeded. She describes the county of Essex as a thriving country and "the whole town of Colchester employed in spinning, weaving, washing, drying and dressing their Bays in which they seeme very Industrious. Great quantities are made here and sent in Bales to London. Colchester is a large town in the compass of Ground. Fformerly there was 16 Churches tho' now much of it is ruined (p. 115, 116). The town Lookes Like a thriveing place by the substantiall houses and well pitched (paved) streets w<sup>ch</sup> are broad Enough for two coaches to go a breast, besides a pitched walk on Either side. Y<sup>e</sup> low grounds all about y<sup>e</sup> town are used for the whetening their Bayes. It is also famed for Exceeding good oysters."

Next to Colchester Miss Fiennes visited Ipswich, "a town that Looks a Little disregarded though their streets of a good size are well pitch'd with small stones." By Enquiry she found it to be "through pride and sloth."—"Thence to Wickham 5 miles, but These are all very long miles." The 36 miles after leaving Ipswich she found Exceedingly Long miles (p. 118), and after entering Norfolk she found "the miles much longer than most miles in Yorkshire." She then entered by a Long Causey (causeway) and a Large stone bridge the city of Norwich "walled round full of towers



and surrounded with Low grounds Employ'd to Bleach their woollen stuff the manufacture of the place.—The walls seeme y<sup>e</sup> best in repaire of any walled City I Know with Carving and Battlements and Towers Lookes well. There are 12 gates in all and 36 churches." Celia Fiennes ascribes the well-deserved prosperity of that important city to its manufactures of *Crapes, Callimanies and Damaskes*, originating with the presence of French Protestant refugees and numerous Dissenters, who have founded schools, hospitals and many charitable institutions.

Leaving Norwich she arrived at Euston hall, the Seat of the Duke of Grafton, and revels in a long and profuse description of the Castle and the pictures she saw there; "one was y<sup>e</sup> Dutchess of Cleavelands pictured in a sultanness dress, the Duke of Grafton being King Charles y<sup>e</sup> seconds base son by her."

At Bury Saint Edmunds she did not see (p. 125) any remains of the renowned abbey but a fine gate and some remnants of the walls.—She thence entered the county of Cambridge and went to the residence of admiral Russel, "now lord Orfford," who fought the French fleet at La Hogue.

Nine-tenths of her so-called Northern journey were performed on horseback on account of the state of the roads which are generally called *lanes*, very narrow, very deep (muddy), crossing commons at long distances from each other, through a moorish (marshy) country; a well-deserved reproach at a time when Sir John Rennie had not made his appearance, and when the great works undertaken by the unlucky Vermuyden had been partly destroyed.—Ramsey mere and *Whitlsome*



*Mer* (Whittlesea Mere) are not passed unnoticed and the city of Ely, as well as most of the lands of Lincolnshire are represented as surrounded with "Watery ditches" and flooded lands, the remains of those which had concealed the brave Hereward and the Camp of Refuge.

Celia Fiennes met with many *dessenters* in Essex and at Ipswich, which reminds us of the few faithful followers of John Wyclif's doctrine who were still extant in those parts at the time of Henry VIII. She is also careful to mention the existence of numerous "dessenters" and meeting houses in Yorkshire, Lancashire, Cornwall and Devonshire. Next to Cambridge follows a visit to the very old city of Ely and its beautiful cathedral adorned with statues "Very proper," in dress (p. 128) finding unfurnished the bishop's palace, "as the prelate does not care to make a long stay there, on account of the unhealthy site of the town."

What she admires in the elegant mansion of Lord Sandwich at Huntingdon is the *ffretwood* in the ceiling of the dining room carved with Irish oak, because "this wood no spider will weave on or endure." But she objects to a want of clothes in a fine picture of Venus hung over one of the Chimneys. The same objection is repeated three pages farther on to very fine pictures adorning the sumptuous residence of the Marquess of Exeter in Burley (Burleigh) house at Stamford, "but they were all without Garments or very little, that was the only fault, the immodesty of the Pictures, especially in My Lords apartment." Burleigh house draws from the pen of our admiring traveller pages of description and praise, first for its site, which is "the finest she

ever saw, on the Edge of a hill," and especially for its luxurious furniture. "My Lord's Bedchamber was furnished very Rich the tapestry was all blew Silke and Rich gold thread, so that the Gold appeared for the Light part of all y<sup>e</sup> Worke. There was a blew velvet bed with gold ffringe and very Richly Embroidered, all the Inside with ovals on the head piece and tester, where the figures are so finely wrought in satten stitch it Looks Like painting. There is also My Lady's apartment severall Roomes very Richly furnished and very ffine Tapestry with Silver and Gold in Most; there was at least four velvet beds 2 plain and 2 figured—Crimson-green—Severall Coullours together in one; severall damaske beds and some tissue beds all ffinely Embroydered. My Lady's Closet is very ffine, the Wanscoate of the best Jappan, the Cushons very rich work: there is a great deale of ffine Worke under Glasses and a Glass case full of all sorts of curiosities of Amber ston Currall and a world of ffine things." We will not follow the author in the over-full and confused description of the drawing-room and of the twenty other rooms; for, "there are at least 20 roomes very Large and Lofty that are all painted on the top; there are at least 20 on the other side of the house all with different ffrett work on the ceiling, besides almost as many more roomes that are a building.—The great variety of the roomes took me up two full hours to go ffrom one roome to another over the house. The bowling-green, Wilderness, nor Walke I was not in, being so great a tract of ground; it is esteemed the ffineest house and situation that is in England and will be *very compleate when ffinish'd*." We must give the author credit

for her quickness of perception. She travelled next to the old city of Lincoln, covering a very high and vast hill crowned by the "Minster very perspicuous and Eminently in view a great many Miles off. The tower, that Great Thoms nest, is 250 steps up, 8 persons may very well stand up in the hollow of the bell together, its as much as a man can reach to the top of the bell with his hand when he is in the Inside; its rarely Ever rung but only by Ringing the Clapper on each side.—The Sea has formerly come up to the town and y<sup>re</sup> has been very deep water where now great part of the town is built" (p. 55).

Celia Fiennes entered next the county of Nottingham, acknowledging the beauty of the Forest of Sherwood and that of the river Trent, "tho' not so broad as the Thames is at Kingston." She mentions the park of Welbeake (Welbeck) a seat of the Duke of Newcastle, the former abbey and mannour Worsup (manor of Worksop), "a very fine pile of buildings built by a Coeheir of the Devonshire house," without any notion of the title of Earl Marshal of the Kingdom vested in the possessor of that Manor, and owned by the Dukes of Norfolk. She takes leave of it with the following remark: "The gardens are very neate and after the London Mode, of Gravel and Grass walks and Mount, and the Squaires with dwarfes and Cyprus (cypress) ffrise and all sorts of Greens and fruite trees, holly trees, box and ffilleroy ffinely cut. I Eate good fruite there." Hampton Court is her favorite type of architecture "had it only been completed by the good queen Mary." The roofs of mansions are frequently termed *Leads* and *Ledes*, which shows that

lead was beginning to take the room of tiles and *slatts* (slates) in the roofing of opulent houses. Timber was still employed in most of the buildings of the southern parts of the kingdom, stone being exceptionally mentioned, as is also flint, as giving a dark appearance to some of the buildings of the town of Norwich.

Bridges were commonly built of stone and very high above the level of the water, which she takes as an indication of the powerful floods in the northern counties. Rivers are seldom named and often misspelt. The Nene flowing by Northampton and Peterborough she names *Lin*. "Bedford its washed by the River Ouse which Comes from Buckingham till it reaches York." She locates Manchester on the rivers Uval or Ouall and Shark (Irwell and Irk). Similar errors are repeated on the Scotch borders, where the Esk is called Essex and the Eden *Emount*. But, although she pays due attention to the nature of the soil, be it clay, chalk, sand or stone, her greatest concern is the presence and actual tasting of fish, crawfish, lobsters, in all the waters she meets with, and their degree of excellence. On two occasions, however, she passes by (p. 51, 131) Shilton (Stilton) in the county of Huntingdon, without mentioning the delicious cheese which gives it now its well-deserved renown, adding (p. 97): "I eate a great quantity of y<sup>e</sup> Red Coralina Bedford Goosbery."

Impressed with due admiration of the beauty and fertility of the country around Nottingham Miss Fiennes says that "the Manufacture of the Town mostly consists in weaving of stockings w<sup>ch</sup> is a very ingenious art. Nottingham is also ffamous for good ale, so for Cellars, they are all dug out of the Rocks and so

are very Cool. Att y<sup>e</sup> Crown Inn is a Cellar of 60 stepps down, all in the Rock Like arch work over your head : in y<sup>e</sup> Cellar I dranke good ale." The town is described as built with good sized, well paved streets, and Nottingham Castle seems to have been still kept as a royal residence, standing on a very high hill, with a flight of 40 steps to the court and hall. The state rooms were lofty, wainscoted with cedar and hung with rich tapestries and embroidery. In one of them was received the Princess Anne when she fled from her father James II. "From the Leads (roofing) and at a distance we see Beavior (Belvoir) castle the Earle of Rutland's house," in Leicestershire.

From the description of Leicester let us take her visit to St. Martin's Church, where she "saw Hyrick's tomb who was Major of the town and was married to one wife 52 years in all, w<sup>ch</sup> tyme he buried neither man, woman or child tho's most tymes he had 20 in his family, his age was 79 and his widow 97 at her death, she saw 162 of her posterity together." As a rare mention of historical events, she notes the field of Bosworth where King Richard III. lost his life, and Narsby (Naseby) where was the great battle fought between King Charles y<sup>fst</sup> and the Parliament of England, and then came to Woolseley where she stayed six weeks at Sir Charles Woolseley's, married to one of her aunts, and "found plenty of crawfish the sweetest and Largest she had seen anywhere, trouts, eeles, tench, perch which Eates in perfection." The sojourn at Wolseley, many times repeated, gave her opportunities to become acquainted with the neighboring counties under her relation's guidance and to get a full



knowledge of all the *Seven Wonders of Staffordshire*. The Diary carries the reader to the many curiosities of the Peak, Chatsworth, Buxton, the marble quarries, mines of copper and spar, Haddon hall, Poole's hole, Elden hole. It cannot be denied that, notwithstanding her vulgarity and matter of fact turn of mind, the authoress was endowed, though to a less degree, with a leaning to the observation of the beauties of a landscape; but the quaint descriptions she gives do not depict them and impart to her reader a share of her enjoyment. In the few stiff lines (p. 199) which give an account of her visit to the Duke of Beaufort's house at Babington (Gloucestershire) we must acknowledge that she shows some sensibility to natural beauties. Her description of Chatsworth, the Duke of Devonshire's residence, does not tally with its present splendors, and she always goes astray among *whanscoating*, hangings, embroideries, carvings, kitchen gardens, orchards, pantries (without giving us an insight into the way of living), hunting of the owners; and she revels in long straight alleys of dwarf trees, cyprus trees, "rows of Ewe (yew) trees very uniform and Cutt neatly."

Her descriptions of landscape picture to us extensive walled-in parks, and long *lanes* instead of roads, *impossible* (impracticable) for coaches, narrowly enclosed between hedges, or quicksets which she calls *enclosures*.

Among the numerous gentlemen's seats we read of Kamwood and *Boudesworth*, both the property of Lord Paget; under the last name we are fain to guess Beaudesert in Staffordshire, the seat of the marquess of Anglesey, the head of the Paget family.

To one of her other trips attaches a far less heroic as-



sociation, but of more present interest. After a stay at Chester, Celia Fiennes was taken across the Dee to a place on the borders of the Welsh county of Flint, the residence of a clergyman named D. Percival, whose wife was a relation of hers. "His parish was eight miles in Extent and two lordships in it, and y<sup>e</sup> ruines of two great Castles in it remains." She calls it *Harding*, a misspelling under which we must recognize the seat of Mr. Gladstone, Hawarden Castle, pronounced *Hården*. Celia Fiennes was thence taken by her kinswoman to Flint, which she declares (p. 149) "a very Ragged place, many villages in England are better." She was on her way to St. Winifred's Well, called Holywell, which she describes at length as being much resorted to, especially by Papists, both as a healing and a sanctifying station. "It was a Session Tyme at Flint w<sup>n</sup> I was there w<sup>ch</sup> shewed it at its prime," and she remarks that during her numerous visits to all sorts of places in the Kingdom she very often has the chance of arriving on market days or during the festivals, pageantry, sessions of courts, electioneering, etc. At Richmond, in Yorkshire, "I met with the Clutter of the Choosing Parliament men" (p. 184).

We will attempt to establish a comparison of the infant state of the mining industry, borrowed from her numerous remarks on that favorite topic. Besides the copper mines in Dorsetshire and coal mines in the neighborhood of Salisbury, now exhausted, coal mines were worked in Flintshire (p. 151)—coal from Warwickshire was carried to Worcester on sledges—coal mines were found on arriving at Shrewsbury (p. 109) and at Chesterfield in Derbyshire (p. 77). She says of Wiggon (Wigan) in Lancashire, "there is that ffine channel coale

are in perfection, burns as light as a candle." The coal trade of Newcastle was paramount, as it is to this day under the name of *sea-coal*, and during Celia Fiennes' visit to the port of Scarborough in Yorkshire, 70 ships were seen in the offing sailing as colliers towards the Tyne (p. 73). In her frequent recurrence to the topic of coal mines of Staffordshire, she decidedly elucidates, and is decisive on the question of the orthography of the name of the famous *candle*, *channel* or *cannel coal*. "Not farre from hence (Wolseley) they have y<sup>e</sup> mines of the fine sort of Coale that is hard and will be polished like black marble for salts or boxes, y<sup>e</sup> only difference, it will not bear the fire as marble does. This is y<sup>e</sup> pitt coale, y<sup>s</sup> cloven and burns like a candle and makes white ashes Like y<sup>e</sup> Scotch coale. The same sort is in Nottinghamshire (p. 90). Their fewel is altogether Coales w<sup>ch</sup> indeed are very good and plenty, you might have a load for 3 or 4 shillings brought home that would serve a poor mans family y<sup>e</sup> winter. Its in great pieces and so Cloven burns light so as the poorer sort works by it and so it serves for heate and light: its very shining Coale all about this country tho' they Complaine they have lost the vein of the best sort which they have still in Wales and Lancashire" (p. 137). Be it also remembered that our author gave the same praise (p. 4) to the *Mindiffe* (Mendip hills, north of Glastonbury) coal extracted in the neighborhood of Warminster. Her attention being alive to all sorts of mineral produce, she names the marble quarries of the Peak, of Cumberland (p. 163), of Plymouth (215), the black lead of Cumberland (p. 157), the stones known under the name of diamonds in Cornwall (p. 219), near Bristol (p. 201), and in the vast cavern of Oaky

hole (Wookey), one mile west of Wells, in Somersetshire, where she saw marvellous stalactites and "rocks Glistening and Shining Like Diamonds and Alabaster" (p. 205).

In her journey through Cheshire and the salterns around Northwich, she says (p. 188): "They have within these few yeares found in their brine pitts a hard rocky salt that Lookes Clear Like Sugar Candy." She also visited all the other salt works of Nantwich, Middlewich and even Droitwich in Worcestershire. In household matters she describes (p. 136) the process by which ferns were allowed to grow even at the expense of agriculture, in order to be burnt and the ashes brought to market in the shape of balls, as substitutes for soda and soap. She is a quick observer of manufactures and a clear-sighted describer of all industrial processes, the "worstead trade, spinning and weaving at Kederminstor (Kidderminster), a large town (p. 195)," the knitting of stockings at Gloucester (p. 197), the serges at Exeter (p. 207), and the "Linnen Cloth and Cottenstickings w<sup>ch</sup> is the manufacture of Manchester" (p. 187).

The description of such tracts as are of a hilly nature impresses the reader with a sense of exaggeration, as in the account given of the Malvern hills and the very tame Downs of Sussex. On her journeying from Halifax to Lancashire she says (p. 186): "That w<sup>ch</sup> adds to the formidableness of Blackstone Edge is that on y<sup>e</sup> one hand you have a vast precipice almost the whole way both as one ascends and descends, and in some places y<sup>e</sup> precipice is on Either hand. This hill put me in mind of y<sup>e</sup> description of the Alps in Italy and of y<sup>e</sup> acc<sup>d</sup> My father gave of those Alps when he passed

them and I could not but think this Carried some resemblance tho' in Little. From the foot of this Blackstone I went to Rochdale 4 miles a pretty neate town built all of stone. Here is a good Large Meeting place well filled ; these parts Religion does better flourish than in places where they have better advantages. Here I observed the Grounds were all Enclosed with Quicksetts cut smoothe and as Even on ffine Greene Bancks, and as well kept as for a Garden and so most my way to Manchester I Rode between such Hedges."

Let us now follow our author through those northern counties in which industry and trade have reared enormous cities which she saw in their infancy and describes with due regard for their laborious beginning. At Manchester she visited new churches, almshouses, well-kept schools for "blew Coate boys, drinking of their beer w<sup>ch</sup> was very good, a very fine Schoole for young Gentlewomen as good as any in London, and music and dancing and things are very plenty here—this is a thriveing place." Rudimentary collections of anatomy and natural history were an appendage to a school for surgeons.

Liverpool, visited on a previous trip, is described (p. 152) as a "very rich trading town, y<sup>e</sup> houses of Brick and Stone built high and even that a streete quite through Lookes very handsome, after the London fashion—well pitched. There are abundance of persons you see well dressed and of good fashion, the streetes are faire and Long, its London in miniature as much as I ever saw any thing." From Liverpool and Preston, and from Lancaster, "a town old and much decay'd,"

we are to follow our bold tourist to the lakes of Cumberland and Westmoreland and content ourselves with a very sober tribute of admiration given (p. 165) to the scenery: "they are standing water with exceeding good ffish." There is but one mention of the ill-fated *earle of Darentwater* (Derwentwater) whose domains were subsequently forfeited to the Crown after his rebellion, and, after a long picture of the now princely mansion of "Louder hall (Lowther hall)," she expatiates in very practical directions about the curing of the Charffish, the mode of potting it, the troublesome presence of rhye bread which always disagrees with her, and the complicated mode of kneading and baking those clap breads of northern counties.

The city of Carlisle is described at length with praise (p. 160) as gracefully watered by the river Emount (Eden). Celia Fiennes ventured over the Scotch border into the county of Dumfries, watered by the river Essex (Esk), and it required no little amount of boldness to do that at a time of permanent disturbance, poaching and smuggling, among outlaws and about ten years before the Union, which scarcely put an end to that unsafe condition of affairs. The consequence was sloth and poverty. The roads were mere paths, affording but little convenience to the solitary traveller across dreary heaths. The paths were no longer provided with those posts and hands, which remind us of Dr. Syntax setting out on his travels and consulting them when in forlorn ignorance of the way he was to take. "These (Scotch) people," says C. F., "tho' with naked leggs are yet wrapp'd in plodds (plaids) a piece of woollen Like a Blanket, or Else rideing hoods—and



this when they are in their houses. I took them for people which were sick, seeing two or three great wenches as tall and big as any woman sat hovering between their bed and Chimney corner, all idle doing nothing tho' it was nine of the clock when I came thither, having gone seven long miles that morning—they have no chimneys, their smoke comes out all over the house and there are great holes in the sides w<sup>ch</sup> Letts out the Smoake.—Not withstanding the cleaning of their parlour for me I was not able to bear the roome; the smell of the hay was a perfume and I rather Chose to see my horses Eate their provender in the stable. My Landlady offered me a good dish of ffish and brought me butter with the Clap bread, but I could have no stomach to Eate.—So I bought the ffish She got for me w<sup>ch</sup> was full Cheape Enough, nine pence for two pieces of Salmon halfe a one near a yard Long, and a very Large trout of an amber Collour, soe drinking w<sup>out</sup> Eating some of their wine which was exceedingly good Claret (smuggled of course) and indeed it was the best and truest Ffrench wine I have drank these seven year, I had the first tapping of y<sup>e</sup> Little wessell and it was very ffine and clear. Thence giving up my intended journey to Edenboroug I took my ffish to carry it to a place for the English to dress it and re-pass'd the Sark and the Essex."

Due praise is given to the beauty of the cathedral of Durham where she noticed "severall ceremonyes and rites retained from the tymes of the papists who are numerous, but its New Castle that has the greate meeting place and many Descenters; they have two very eminent men one of their name was D<sup>r</sup> Gilpin whose



book I have read in." Thence entering Yorkshire our traveller comes to Richmond, crowned by the ruins of an old castle, but "so decayed and sad shattered that it is like a disregarded place and there were only two good houses, one belonging to M. Darcy the Earl of Holderness's brother."

Celia Fiennes's repeated journeys to Yorkshire had been prompted by the care of her health and the use of the mineral springs of Haragate (Harrowgate) and Knaresborough, and here again, as well as at the Holy well of St. Winifred, some superstitious feelings as well as worldly views brought Catholic pilgrims to resort to those *spaws* which she calls "stincking on account of Brimstone. Bones are secretly dug out of the ruins of an old abbey and taken away as sanctifying relics."

In praise of Leeds our traveller has much to say, being fond of new cities, as "it is a Large town, severall Large and broad Streetes, Cleane and well pitch<sup>d</sup> and good houses all built of stone. This is esteemed the wealthyest town of its bigness in the Country its manufacture is the woollen cloth, in which they are all employed and are esteemed very Rich and very proud; here if one calls for a tankard of Ale w<sup>ch</sup> is always a groate, their Ale is very strong, but for paying this Groate for your Ale you may have a slice of meate or Else butter and Cheese gratis into the Bargaine—This town is full of discenters, there are two large meeting places, here also a good schoole for young gentlewomen." She says quite as much of several towns in Devonshire and Cornwall, those western parts in which Monmouth found the greatest number of his adherents,

and Jeffreys made the greatest number of his victims under James II.

Of the now large and prosperous city of Halifax she writes "she resolved not to goe to that ragged and almost ruined town (p. 186) and y<sup>e</sup> Engine that town was famous for to behead their Criminalls at one Stroake w<sup>th</sup> a pully was destroyed since their Charter was taken from them." Few people are aware that the *guillotine* was not of French origin. She does full justice and gives a full tribute of praise to the beauty of York Minster, especially to the vast proportions of the lofty windows which adorn the Quire (Choir) and to their pictures, but she finds fault with the narrow streets and the old-fashioned houses too much clustered together and the bridge over the river Uise (Ouse) which is obstructed, being built upon with houses as was the old London Bridge and the bridge over the Avon at Bristol, while she praises the bridge over the Medway at Rochester for the reverse. From the few lines given to York Minster she soon goes astray (p. 58, 66, 68, 69 and 74, 77, 198) on fish cooking, codfish, salmon, pigs of Rippon and Chesterfield ale "generally esteemed the best in the Kingdom." She mistakes the river Derwent in Yorkshire for the one which flows through Derbyshire.

She experiences a special and well-deserved fondness for Herrifordshire (Herefordshire), which she repeatedly visited, not indeed exclusively for its smiling landscape, but also for its fruitful orchards (p. 8) and its skilful method of cider pressing. She several times mentions (p. 33, 287, 191 and 268) the Man-born or Manbern Hills (Malvern hills) which rise *like the Alps* between Herefordshire and Worcester-

shire and "seem vastly higher than these in the neighbourhood of London and whose descent is as long and steep in some places as its rising was." As a compensation for such comforting truisms and for a dry and prosaic description (p. 196) of the New House built at Stoake by her relation, M<sup>r</sup> Folies, let us borrow a few lines which were written at the same spot by Motley (Letters II., p. 298) when he spent a few days at Madresfield Court, "an old moated house dating far back into the Plantagenet days, belonging to Lord Beauchamp, who took me one day to visit Witley, the magnificent place of Lord Dudley, which I did not admire. They say that £200,000 have been spent in remodelling and furnishing it since he bought it of Lord Foley. But it is altogether too smart, gilt gingerbread. We ascended to the summit of the Malvern hills, and enjoyed the view over the smiling hills of Herefordshire on one side with the hills of Wales in the background and the wide sweep and beautiful highly cultivated hills and dales of Gloucestershire, Worcestershire and I know not what else. Another day I went with Lord Beauchamp to Worcester to visit the cathedral, which is not a very admirable church. We went duly through the famous Worcestershire potteries, passing on the road a splendid villa built by the proprietor of the Worcester Sauce and subsequently I went with Lord Beauchamp to Tewkesbury, famous for the bloody meadow fight, for its beautiful, stately, most imposing Norman Abbey and for its mustard." *Sic transit gloria.* Celia Fiennes' crooked journeys, which we cannot but envy her, led her to many of the finest middle age monuments, which are very dryly disposed of; the abbey of S<sup>t</sup> Alban's (p. 98) out

of repair, the Cross at Coventry (p. 91, 92),—Warwick with the monument of the “great Earle of Leisters and his Ladyes in stone curiously.”

As she includes a trip to Cornwall in the Diary of her *Great Northern Journey* we must still follow her westwards. Over hills and vales and through the *lanes* of Somerset and Devonshire does she approach Exeter, conspicuous only from a distance of one mile, with the river Ex and its estuary further on. She expatiates on its prosperous industry: “Exeter is a town very well built; the streetes spacious and noble are well pitch’d, and a vast trade is carried on; as Norwich is for crapes and Damaske, soe this is for serges. There is an Incredible quantity of them made and sold in the town. It turns the most money in a weeke of anything in England. One weeke with another there is 10,000 pounds paid in ready money, sometymes 15,000 pounds. The weavers bring to market their serges and must have their money w<sup>ch</sup> they Employ to provide them yearne to go to work again.” She describes to perfection the intricacies and beauties of Plymouth harbor, and she saw in the distance Eddystone Lighthouse building “with God’s mercy,” p. 215.

On the year following that protracted journey C. Fiennes accomplished a much shorter one in the Metropolis and its vicinity, to Windsor, Eton, etc., giving us a full and minute description of the municipal constitution of the City of London, its regulations and ceremonies, Houses of Parliament, Inns of Courts and Courts of Law, the pageantry of the coronation; and shows herself fully conversant with those practical business matters.

## GEOGRAPHICAL NOTES.

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THE ANGLO-PORTUGUESE QUESTION.—This Society has received the Protest, sent out by the Lisbon Geographical Society on the 13th January, 1890, to the Academies and Societies, with which it maintains relations.

In this document the Lisbon Society states, from its own point of view, the causes which led to the difficulty between Portugal and England, and to the English *ultimatum* of January 11th; and solemnly records its protest against this *ultimatum* as the culmination of a policy characterized by injustice and by violence.

The Madrid Geographical Society, in a letter dated January 15th, energetically supports the Protest, and calls upon kindred associations throughout the world to unite in condemning the English aggression on the rights of Portugal in Eastern Africa.

The American Geographical Society respectfully acknowledges these communications, but can have no opinion to express with regard to the matters in dispute between England and Portugal.

GEOGRAPHICAL SOCIETY OF THE BROOKLYN INSTITUTE.—This Society was organized, as a Department of the Brooklyn Institute, at a meeting held on the 7th of February, 1890. The purposes of the Society are thus set forth :

“ It is expected that the Department will conduct popular courses of Lectures on Physical Geography, Political Geography, Historical Geography and Ethnographical Geography ; that it will afford opportunity for the presentation of technical, scientific and scholarly papers on various branches of Geographical inquiry for discussion by the Department, and for publication ; that systematic courses of lectures on special subjects will be provided for the benefit of those who may be particularly interested in Geography either as teachers or students ; that it will stimulate a practical interest in the subject in the community ; and that it will co-operate with libraries and other educational institutions in their efforts to improve the methods of teaching Geography, and of making known the great wealth of information available on this very important and very practical subject.”

In the few weeks that have elapsed, sixty members have been enrolled, and there can be no doubt that the Brooklyn organization is called to do serious and useful work.

AN INTERESTING DOCUMENT.—The *Bollettino* of the Italian Geographical Society, for December, 1889, has a note on the directions to his son Diego, written by Columbus before setting sail on his third voyage.

The document, which has never been published, forms part of the great Vargas Ponce collection in the library of the Academia de la Historia, at Madrid. It is a faulty copy of the original, but the only one known, and will be brought out *in extenso* in the Memorial Publication, which the Italian Government is preparing for the year 1892.



In advising his son, Columbus treats separately of the duties he owes to his own family, to his sovereigns, and to society in general. He commends to his care, in most affectionate language, Beatriz Enriquez, the mother of Fernando, and requires him to pay to her an annual sum of 10,000 *maravedis*; and he further exhorts him to have especial consideration and regard for the Admiral's brother Diego and sister-in-law, Violante Muñiz.

In his relations with the king and the queen, Diego is to show himself always devoted and obedient, and to be modest in applying for favors.

The Admiral admonishes his son, in the name of God, to be kind and charitable to his fellow men, and to treat them all, the powerful and the lowly, with equal fairness. He charges him more particularly to bestow upon the suffering and the needy the tenth part of his disposable means, from whatever source derived; and impresses upon him the necessity of keeping a monthly account of all his expenses. Finally, he refers Diego, in all difficulties, to the wise counsels of his father's most cherished friend, the friar Gaspar Gorricio.

THE FIRST SKETCH OF THE ERIE RAILROAD.—A pamphlet, recently presented to the library of this Society by one of the Fellows, is a document of some historical interest. It is the second edition of a "Sketch of the Geographical Rout of a Great Railway, by which it is proposed to connect the canals and navigable waters of New York, Pennsylvania, Ohio, Indiana, Illinois, Michigan, Missouri, and the adjacent States and Territories opening thereby a free communication at all seasons of the year, between the Atlantic States and the Great

Valley of the Mississippi. New York: G. & C. & H. Carvill, 1830."

The author's name is not given, but a written memorandum on the cover ascribes the sketch to W. G. Redfield. The *rout*, as described in the text and shown on the accompanying map, leaves the Hudson River at the Tappan Sea, passes through the Delaware and Susquehannah valleys and across the head-waters of the Genesee to the valley of the Alleghany, thence across the Ohio Canal and the head-waters of the Wabash, in Indiana, to the head of steamboat navigation on the Illinois; and reaches the Mississippi River immediately above the Rock Island rapids.

Great care seems to have been taken, in planning the line, to avoid the great lakes, as well as the neighborhood of large towns, and to intersect as many canals as possible: principles of construction which the reader finds it difficult to harmonize, until he comes to the statement on page 17, that "The use of railways does not result in that deterioration of morals which usually attends the business of canals, and which is occasioned by the unhappy influence that boatmen often exercise upon each other, and upon the society with which they mingle when unoccupied. A single person is sufficient to conduct a load on a railway, and his attention is necessarily engaged by the duties of his employment."

Mr. Redfield was clearly persuaded that the railway conductor would be a missionary of redemption to the depraved canal boatmen; and this he might have been if the railway had followed the great Geographical Rout.

The gods would not have it so, and the projector's

calculations were brought to naught. He enumerates among the advantages of the railway, as compared with the canal, that the former is less liable to interruption and to accident, that it occasions less general hazard and loss of life, and that its cost is not more than half or two-thirds that of a canal *through the same rout*. The cost of canals is said to average about \$17,000 per mile, though it often exceeds \$22,000,— while “a single railway, or one set of tracks, with suitable turn-outs, will cost from \$7,000 to \$8,000 per mile, and a single railway, with turn-outs, and graded sufficiently wide for two sets of tracks, will cost from \$10,000 to \$11,000 per mile.” A railway, with double tracks throughout, from the Hudson to the Mississippi could be built, it is affirmed, for \$15,000,000; “little more than half the annual amount of the national income.”

Americans are urged to this conquest of mind over the inertness of matter by the example of the ancient Romans, who could cross hills and valleys, “with their stupendous *appian ways* to subserve the purposes of ambition and conquest;” though it must appear to be a doubtful advantage that, with means for moving military forces and materiel “with a rapidity resembling that of an express-rider, we should have little occasion to claim the respect of our proudest foes, whether savage or civilized.”

Things have changed since 1830, when Mr. Redfield could only refer to three railways in the United States as in full operation: the Quincy road, 7 miles long, in Massachusetts, and the Mauch Chunk, 9 miles, and the Lackawaxen, 16 miles long, both in Pennsylvania. Those commenced and in progress were: the Baltimore

and Ohio, of 350 miles, the Baltimore and Susquehannah, of 48 miles, the Richmond and Chesterfield, Va., of 12 miles, the Columbia, from Philadelphia to York, of 96 miles, and the Pottsville, Pa., length not given.

Others named, as authorized by law, or soon to be undertaken, are: the Massachusetts, 200 miles long, from Boston to the Hudson, the Boston and Providence, 43 miles, the Boston and Brattleborough, 114 miles, the Albany and Schenectady, 16 miles, the Hudson and Berkshire, 25 miles, the Cattskill and Ithica, 167 miles, the Ithica and Owego, 28 miles, the Amboy and Bordentown, N. J., 30 miles, the Frankstown to Johnstown, Pa., 40 miles, the Baltimore and Washington, 38 miles, and the Charleston and Augusta, S. C., 130 miles long. The terminus of this last road, it should be noted, was at Hamburg, S. C., opposite to Augusta, which is in the State of Georgia.

THE ASCENT OF PICHINCHA.—*La Géographie*, of February 20th, publishes a letter, in which Mme. de Sédières gives an account of the ascent of Pichincha made on the 10th of December last by ten persons, of whom she was one.

Pichincha is a volcano about 11 miles W. N. W. of Quito, in the Western Cordillera of the Andes. It is 100 feet higher than Mont Blanc, but the monarch of mountains is far more difficult to climb. The party from Quito suffered nothing worse than fatigue and cold, both relieved by supplies of Bordeaux and Champagne.

The start from the camp on the lower slope of the mountain was made at three o'clock in the morning.

The night was superb and brilliant with stars, and constellations of the southern and the northern heavens. A halt after an hour gave a view of the sunrise, which came like a flood of gold over the mountains, while the mists below shone like silver. As the horizon broadened with the ascent the circle of glaciers increased till fifteen were counted in view at the same time, and beyond, towering over the lesser summits, rose Cotopaxi and Antisana and Callambe and, far away, Chimborazo.

There was no sign of activity in the crater, which opened fifteen hundred feet deep, streaked from top to bottom with wall-like ridges of black rock. Here and there lay stretches of crystallized snow.

Mme. de Sédieres is the only woman who has climbed the peak of Pichincha, and her distinction may last longer than that of some others who have gone up, merely to come down again.

THE BORE OF THE AMAZON.—It will interest Commander Osborne Moore, R. N., whose paper on the bore of the Tsien-Tang-Kiang was noticed in the December BULLETIN, to learn that the water of the Amazon River rises almost as high in the office of the London *Athenæum* as in Sir Archibald Alison's "History of Europe." The critical journal, reviewing on the 11th January "A History of Bridgwater," mentions the narrow escape of Cromwell and Fairfax, when caught in the bore of the river Parret, in July, 1645, and adds, for general information, that: "The 'bore' in a tidal river is the great wave moving in the van of the oncoming tide, as those who are familiar with the mighty rivers of America know only too well—especially those who are

familiar with the Amazon, whose 'bore' is over a hundred and fifty feet in height."

A RECENT VOLCANIC ISLAND IN THE PACIFIC.—Capt. W. J. L. Wharton, R.N., F.R.S., sends to *Nature*, of January 23d, the following notes, on a matter not hitherto fully reported :

In 1867 H. M. S. *Falcon* reported a shoal in a position in about  $20^{\circ} 20'$  S., and  $175^{\circ} 20'$  W., or 30 miles west of Namuka Island of the Friendly or Tonga Group.

In 1877 smoke was reported by H. M. S. *Sappho* to be rising from the sea at this spot.

In 1885 a volcanic island rose from the sea during a submarine eruption on October 14th, which was first reported by the *Janet Nichol*, a passing steamer, to be two miles long and about 250 feet high.

The U. S. S. *Mohican* passed it in 1886, and from calculation founded on observations in passing, gave its length as 1 4-10 miles, height 165 feet. The crater was on the eastern end, and dense columns of smoke were rising from it.

In 1887 the French man-of-war *Decrès* reported its height to be 290 feet. In the same year an English yacht, the *Sybil*, passed it, and a sketch was made by the owner, H. Tufnell, Esq., which is here produced.

The island has now been thoroughly examined and mapped, and the surrounding sea sounded by H. M. surveying ship *Egeria*, Commander Oldham.

It is now 1 1-10 mile long, and 9-10 of a mile wide, of the shape given in the accompanying plan. The southern portion is high, and faced by cliffs on the south,



the summit of which is 153 feet above the sea. A long flat stretches to the north from the foot of the hill.

The island is apparently entirely formed of ashes and cinders, with a few blocks and volcanic bombs here and there, especially on the verge of the hill. Under the action of the waves, raised by the almost constant south-east winds, this loose material is being rapidly removed; continual landslips take place, and Commander Oldham is of opinion that the original summit was some 200 or 300 yards southward of the present highest cliff,



By H. Tufnell, Esq., 1887, bearing S.E. about 2 miles



By "Egeria," 1889, bearing E.  $1\frac{1}{2}$  mile.



By "Egeria," 1889, bearing N.N.W.  $\frac{1}{2}$  W. 1 mile.

and that the shallow bank stretching to the south represents the original extension of the island.

As far as can be judged from Mr. Tufnell's sketch from the north-west and that of the *Egeria* from the south-south-east, considerable changes have taken place in two years, the different summits shown in the former having disappeared as the sea has eaten away the cliffs. The flat to the north seems to be partly due to redistribution under the lee of the island of the material removed from the southern face. It is crossed by curved ridges from three to twelve feet high, which Commander Oldham considers to have been formed as high

beaches during spring tides and strong winds, the flat ground between them, almost at the level of the water, being deposited under normal conditions of weather. The island is thus gaining on one side, while losing on the other, but when the high part has gone, this partial recovery will probably cease. A little steam issuing from cracks in the southern cliffs was the sole sign of activity, but a pool of water at a temperature of from  $91^{\circ}$  to  $113^{\circ}$  F., water which rose in a hole dug in the flat of a temperature of  $128^{\circ}$  F., and a temperature of  $100^{\circ}$  F., in a hole dug half-way up the slope, also show that the island still retains heat near the surface. The water is sea water that has filtered through the loose ashes, and it rose and fell with the tide.

It appears by the condition of the flat that the island has neither risen nor subsided during the past two or three years.

It will be interesting to watch the ultimate fate of this last addition to the Pacific isles, but it seems probable that its existence as an island will be short unless a hard core is yet revealed.

The soundings between Falcon Island and Namuka show that they are separated by a valley 6,000 feet deep.

Metis Island, 73 miles north-north-east of Falcon Island, is another volcanic cone that appeared a few years before the latter, but has not yet been examined.

**HYPSONOMETRICAL MAP OF EUROPEAN RUSSIA.**—At the meeting of the Paris Geographical Society, on the 7th of February, M. Venukoff presented a copy of the hypsometrical map, recently published by Gen. A.

Tillo. This work, which is on a scale of 1/2,520,000, contains the result of the author's labors for the last fifteen years.

The territory covered is that between the 44th and the 60th degrees of north latitude. The northern portion of Russia in Europe has been omitted, for want of sufficient data; and the Caucasus, already fully represented by orographical and relief maps, has been excluded, because its introduction would have involved the necessity of diminishing the number of tints in the lower parts of the country, so that it would have been impossible to show the relief of Central Russia.

The plan of tinting adopted is the following: The mean elevation of European Russia being 170 metres (557.75 feet) General Tillo has taken this elevation as the dividing line between the low lands and the high lands.

The former are colored green (5 shades), the latter bistre (12 shades). The shades become deeper and deeper as they descend, or rise, from the line of mean elevation at 170 metres. As far as an absolute elevation of 700 metres, equidistant lines are traced at every 10 metres; beyond 700 metres, the lines are drawn at every 100 metres; the figures being approximate in both cases, for the elevations are expressed on the map in *sagènes*, one of which is equal to 2.18 metres.

General Tillo has enumerated on the margin of the map the documents used in its construction; and he has explained in two pamphlets the scientific value of his authorities and the principal orographical results as to the surface relief of European Russia. These results do not agree with the ideas previously entertained on

the orography of the country, but correct them in essential particulars.

FROM PEKING TO KASHGAR.—The February number of the Royal Geographical Society's *Proceedings* has a paper on the Great Central Asian Trade Route from Peking to Kashgaria, an abridgment of a manuscript by Col. Mark S. Bell, R. E., who made the journey of 3,500 miles in 1887. The route is a cart road, that passes through the province of Shansi to the Wei Valley at Si-ngan-fu, and thence through Shensi, Kansu, and the New or Sin-Kiang province of Kashgaria, and Colonel Bell was the first Englishman to travel it in its entirety. Besides this there is the Ala-shan route, across the Little Gobi desert, the one usually taken by camel caravans *via* Kwei-hwa-cheng to Barkul. Kwei-hwa-cheng is the terminus for the Mongolian and Tian Shan camel trade routes, and Si-ngan-fu the Chinese centre for the cart and pack animal routes leading to Kashgaria, Koko-nor, and Tibet.

The road for 218 miles, over the great plain of Chili, was generally in good order.

Beyond this plain, the road passed for 1,400 miles through the *loess* hills. The *loess*, according to Richt-hofen, is a solid but friable earth of brownish-yellow color, differing from loam by its highly-porous and tubular structure. The tubes are often lined with a film of lime and ramify like the roots of plants. The *loess* spreads over both high and low ground and its thickness often considerably exceeds 1,000 feet.

The plain of Chili is about 600 feet above the sea, thickly populated and well cultivated. Shan-si, the next

province to the west, is very rich in coal and iron, but does not grow enough grain for its own consumption.

Near the western border of this province Colonel Bell took to the Chinese dress of blue cotton leggings, blouse, travelling cap and spectacles, and so saved himself many a mobbing.

Shen-si, the next province, produces abundance of grain, and for days around Si-ngan-fu, the capital, the traveller passed through one vast wheat-field. Besides wheat, Shen-si exports cotton, cotton goods, tobacco and opium, and receives from Shansi coal, iron and salt, and from Kansu cotton, rhubarb, furs, skins, felts, mules, cattle and sheep.

Si-ngan-fu, which was the capital of China for 2,000 years, is a fine city, with a circuit of eight or ten miles, lofty walls, massive gateways, and walled suburbs. "Withal," says Colonel Bell, "it seems unrivalled for open drains;" otherwise it is a clean city with narrow streets, many of which are paved.

From this city Lan-chau-fu, the capital of Kansu, was reached in twelve days over a difficult hilly country, the road crossing heights of 8,000 and 10,000 feet, and during the greater part of the time being at an elevation of between 6,000 and 7,000 feet. The distance is 449 miles, and the road is at times a fine highway 100 feet wide; at others it narrows to 8 or 10 feet.

This region was devastated during the Mohamimedan rebellion, which ended fourteen years ago (written in 1887), and out of 15,000,000 of inhabitants less than 2,000,000 remain. Lan-chau-fu is at an elevation of 5,500 feet, a fine city, with about 40,000 houses, and has a direct trade with Russia.



From the Tibetan border of Kansu there is a gradual ascent to the water-parting and an easy descent beyond to Lhasa in Tibet. This has been excellently described, says Colonel Bell, by Huc, and he adds: "Prejevalski has, I think, too hastily thrown discredit on the works of this talented Jesuit, to the pertinency of whose remarks and to the accuracy of whose observations, whenever and wherever I have been able to test them, I desire to pay tribute."

From Lan-chau-fu the road led north and north-west, following for a considerable distance the line of the Great Wall, often wanting in places, and in the Little Gobi desert but six to eight feet high and a few feet thick. Eighteen miles beyond Su-chau-fu, at Kia-yu-kwan, celebrated as a fortress guarding the extreme north-western entrance into the empire, the Wall came to an end.

Colonel Bell found the Gobi desert much better than its reputation. Water could be readily obtained and was often close to the surface.

From Hami near the northern edge of the desert, at an elevation of 2,650 feet, the road led across the Tian-Shan and then to the west to Hung-Miotza, or Urumtsi, the capital of Sin-Kiang, the new Chinese frontier province formed to include Kashgaria, outer Kansu, Ili, Zungaria, etc., and extending to the Russian border and Mongolia. Here the Chinese have concentrated their chief military strength and are building a city, intended to be an impregnable walled town; but Colonel Bell considers the site indefensible. The town stands in an undulating valley, five to seven miles broad, penetrating the Tian Shan range.



At Toksun Kashgaria was entered, and the route led to the south-west and west, by Karashahar, Korla, Kuchar and Aksu, to its terminus at Kashgar.

In this region the people are largely of Turkish race and Mohammedan. They are well made, the men averaging 5 feet 9 inches in height, and families of five or six children are common. At Kuchar and Aksu the Russian goods were preferred to the English and Indian varieties, and at Kashgar even the Indian merchants retailed the Russian cottons and chintzes.

Colonel Bell's observations led him to the conclusion that a system of railways is a necessity for China, if the Government is to retain its hold on the distant provinces, and to resist the increasing weight of Russia on the frontier.

The Mohammedan rebellion robbed China not only of Kashgaria but of the greater portion of Kansu and of part of Shensi; and her hold on all these is very loose to-day. At the same time the fact is noted that the Kashgarians are well treated, though they probably would not fight against Russia; and the admission is made that all the Indians, of whom many are established in Kashgaria, praise the Chinese rule and prefer their new home to India.

Colonel Bell has evidently studied China and the Chinese with a singularly free mind, but his opinions concerning the physical and moral charms of the race would have delighted Denis Kearny and the sand-lot men. "It was pleasant," he says, "to look upon the comely, buxom, good looking Turk woman, after that distressingly hideous deformity of her sex, the Chinese woman." In the bazars of Aksu he was remarked as a

Farangi, *i. e.*, one of a race known as the conquerors of India, and the successors to the inheritance of its Moghul dynasty. None the less, he adds: "A Chinaman or a Mohammedan Chinaman, a class who have retained all the facial and other hateful characteristics of the Chinese, such as pride and impudence, would, however, never fail to equally proclaim that to him I was a *jan-quesah*, a 'foreign devil.'"

TRIVIER'S JOURNEY ACROSS AFRICA.—Africa has been crossed once more, and this time by a Frenchman, Captain Trivier, who left Loango on the 10th of December, 1888, and arrived at Quelimane, December 1st, 1889, accomplishing the feat in less time than any of his predecessors. These were: Silva Porto, Livingstone, Cameron, Stanley (twice), Serpa Pinto, Capello and Ivens, Wissmann (twice), Lenz and Gleerup. Captain Trivier and his two Senegalese attendants were well armed, but had no occasion to use their weapons. At Stanley Falls they were hospitably received by Tippu Tip, whose safe-conduct passed them on to Ujiji, which was reached on the 6th of June. Captain Trivier was ready to leave for Unyamwebe, when his host, the Chief Rumariza, received a letter from Tippu Tip, charging him not to let the Frenchman take the road to the east, because the people in that direction were greatly excited against the Europeans. The route to the north was closed by the Mahdists; the one that led to Masai land could only be forced, Rumariza said, by five hundred good soldiers; and Captain Trivier turned to the south, along the western shore of Tanganyika. He passed the French and English missionary stations,

and met with nothing in the way of adventure until he reached the Nyassa and the Shiré river, in November, two weeks after the encounter between the Makololo and the Portuguese under Serpa Pinto. Their overthrow had filled the Makololo with consternation. M'laoré, the chief who had made the attack on the Portuguese, was in hiding, and his people had deserted their villages. Near one of these Captain Trivier found Serpa Pinto, with his army, which numbered 5,000 men. Besides this land force, there were three armed vessels on the Shiré. The Portuguese commander said he meant to clear the river up to the Nyassa and to teach the Makololo a lesson. During the interview the Frenchman said he was eager to reach the coast in order to send a telegram to France. "You can do that here," said Serpa Pinto; "I lay down the wire behind me as I march."

Captain Trivier's letters, from which these details are taken, were sent from Zanzibar to the Bordeaux journal *La Gironde*; but his most remarkable discovery is reported in *Le Figaro*, of March 1st, in these words: "As for the famous Congo Free State, M. Trivier does not know what to think of it. It is said that this Company, created by the Belgian State itself, not being able to undertake openly the trade in ivory, makes use of the American cloak to cover its commercial operations."

There is always something new out of Africa, and Captain Trivier may fairly boast of having distanced probability and common sense, as well as his predecessors. It is strange that, with *Le Figaro* to help him, he forgot to show that the resignation of Bismarck

would be the natural consequence of Tippu Tip's policy at Stanley Falls.

MUTILATION OF MONUMENTS IN EGYPT.—Lieut.-Col. J. C. Ross, Inspector-General of Irrigation, Egypt, writes to the London *Academy*, of February 8th, that “some fiend has been secretly destroying some of the most interesting monuments of middle Egypt.” Name-ovals and inscriptions have been cut from the tombs of Ameni and Khnum Hotep and Der-el-Barsha; and the head of the celebrated Colossus on a Sledge has been destroyed in the fresco at Der-el-Barsha.

Colonel Ross adds: “It is evident from the objects selected for removal that the spoiler is directed by some European agent; and I write this to put Egyptologists on the alert, so that if the face of the Colossus or the stolen cartouches are found in any European or American museum you may hold its curator up to the execration of the scientific world.”

Execration, and even more than that, the supposed curator and his assistant fiend do, indeed, richly deserve; but there is no great difference in principle between the spoliations practiced by their methods, and those carried out with order and decency, and on a larger scale, for the decoration of New York and London.

Prof. A. H. Sayce in the *Academy* of March 1st, is even more emphatic than Lieut. Col. Ross. “This letter,” says Mr. Sayce, “ought to be headed ‘The Destruction of the Ancient Monuments of Egypt.’” The tax of 100 piastres imposed a year and a half ago upon every person who wished to visit the great monuments of Upper

Egypt, produced, according to Mr. Sayce, more than £1,000 last year, but not a farthing of the money seems to have been applied to the protection of the monuments, the purpose for which the tax was levied. On the contrary, more havoc has been wrought during the last three months than during the whole of the last half century.

If destruction goes on at such a rate when the hands of the Khedive's government are strengthened by the support of the English, what would become of the monuments if Egypt were left to take care of herself, as in the days of Mehemet Ali?

The editor of the *Academy* notes the fact that the Government, when questioned in the House of Commons concerning this matter, had "received no such information"; and mentions also that the *Times* of February 21st contained a letter from Dr. Jex Blake, complaining of the mutilation of the tomb of Knum Hotep at Beni Hassan, and adding that he was informed by his dragoman that "the outrage was committed, within the last three months, by a German." The dragoman, being an intelligent person, knew that the outrage could not have been the work of an Englishman; but it does not appear why he was led to make the offender a German, rather than a Dane or an Italian. With the help of this keen interpreter it may be possible to explain some of Mr. Flinders Petrie's doings in the Fayum.

Dr. Schweinfurth, who writes (in Petermanns Mittheilungen, 36 Band, II) with great approbation of Mr. Petrie's labors and of the conclusions reached by him, condemns with severity the method, or lack of method, employed in the excavations. By the terms of the concession for the

work, a selection of the articles found was delivered to the Egyptian authorities. The remainder was for the English and might be regarded, in the words of Maspero, as saved. Much of it, however, went to ruin by wind and weather and the pressure of the quantity collected; for, says Dr. Schweinfurth, it must be told without circumlocution that Flinders Petrie paid no particular attention to his technical outfit. He had no tent and no boxes, and many a little object of priceless value was swept away by the wind, or carelessly trodden out of shape in the desert sand. For the fragile and easily crushed articles, and especially for the remains of plants and for vegetable fibres, no envelope could have been more unfit than the mummy wrappings, so conveniently at hand. In order to get at anything that was new, Mr. Petrie went through his work in a very summary fashion, and destroyed where he ought to have secured.

Dr. Schweinfurth's remarks should be pleasant reading for the subscribers to the Egypt Exploration Fund.

THE RAIYÂN MOERIS AND THE SILSILEH PROJECT.—In January last the Egyptian Government sent Mr. W. Willcocks, Inspector of Irrigation, to Wadi Halfa with instructions to report upon the possibility of storing Nile water to the south of Gebel Silsileh. Mr. Willcocks has returned to Cairo, and reports that both the Silsileh and Kalbusha projects are utterly impracticable.

Sir C. C. Scott-Moncrieff says that the Raiyân project is the only scheme which the Egyptian Government has to consider. It must, therefore, be put in hand at once, in spite of Mr. Flinders Petrie's dictum, quoted with reserve by Dr. Schweinfurth in *Petermanns Mittheilungen*



(36 Band, II), that he "most positively denies the existence of a Lake Moeris, as understood by Cope Whitehouse, because there never could have been, in historical time, any communication between the depressions of the Raiyān and Moële and that of the Fayum."

Historical time has covered and will cover a number of rash assertions. Leaving the past to take care of itself, the engineers, who have the Raiyān storage lake in charge, will be stimulated in their task by the complete success which has attended the restoration of the great French work, the Barrage.

PORTUGUESE EXPLORATIONS IN AFRICA DURING THIS CENTURY.—The *Journal of the Manchester Geographical Society*, Vol. 5, Nos. 4-6, takes from the British Association Reports for 1889 a sketch, made by Mr. J. Batalha-Reis, F. R. G. S., of the work done by the Portuguese, since the year 1802, in the exploration of southern Africa.

This work has passed without recognition for two reasons: Portugal is not a Great Power, and the Portuguese write in their own tongue, which is very little read by men of other nations. These reasons, unworthy as they are, will continue to have their influence on general opinion, but the Portuguese must always resent the gross assumption, too frequent in English and American publications, that Portugal is to receive lessons in morality from some other Power.

Mr. Batalha-Reis's article is as follows (spelling unchanged):

"From the fifteenth century to the present time the Portuguese have not ceased to explore those parts of

Africa where they settled, causing the continent to be traversed from the coast to the interior, and from the Atlantic to the Indian Ocean. Outside Portugal the greater part of the Portuguese explorations of the nineteenth century are entirely unknown. Many geographers and the public in general believe, and repeat daily, that Portugal has done nothing in Africa since the sixteenth century, and that even then her travellers explored only the African coast. As ignorance regarding the chapter of geographical history is the origin of many and great mistakes in modern questions which are linked up with politics and international right, and with which public opinion is so intensely preoccupied just now, I judge it to be opportune to present an indication of the principal Portuguese explorations, at least, from the beginning of the nineteenth century, with the mention of the principal documents wherein the little-known literature of the subject may be studied. The chief Portuguese explorations of this century commence with its earliest years. In 1802 the expedition sent out by Colonel Honorata da Costa from Angola, which traversed the whole of the continent from the basin of the Kassai to the basins of the Lualaba, Luapula, Bangweolo-Bemba and North Loangwa, arrived at Tete in 1811. In 1804 and 1805 Father Cannecatim published his dictionary and remarks upon the Bunda, or Angolense, language, and the narrative of his journeys in Africa. In 1831-1832 Monteiro and Gamitto explored the region between Lakes Nyassa, Bembo-Bangweolo, and Moero and the River Zambeze. In 1838-1848 Major Francisco J. Coimbra made his journey from Mozambique to Benguella, across Africa, and visited the

lakes to the north of Kalaari. In 1843-1847 Joachim Rodrigues Graça went from Golungo to Bié, and thence to Lunda, almost at the eastern extremity of the basin of the Kassai. For many years Silva Porto travelled and explored the territories between the valley of the Kwanza and that of Liambye on the Upper Zambeze. In 1852-1856 his expeditions travelled from the Upper Zambeze to the Upper Luangué, and between the basins of the Zambeze and of the Congo, passed to the south of Nyassa, and crossed, diagonally, the region between the Nyassa, the Rovuma, and the sea. In 1855-1856 Montanha and Teixeira explored the territories between Inhambane, the Limpopo, and the north of the Transvaal. In 1877 expeditions of engineers were sent by the Portuguese Government to all their colonial provinces of Africa, and instituted the investigations and works which have gone on up to now and from which the first railways in these regions had their commencement, the more perfect knowledge of many of the regions being also due thereto. In 1877-1878 Serpa Pinto crossed the continent of Africa from Benguella to Bié, and thence by the affluents of the Kwando, to the Upper Zambeze, thence to the lakes north of Kalaari, thence through Bechuanaland to the Transvaal and Natal. In 1877-1880 Capello and Ivens went from the valley of the Cunene to the valley of the Kwanza and thence to that of the Kwango, which they investigated nearly as far as lat. 6° S.

In 1883, Antonio Cardosa visited the districts which lie between the river Save and the upper valleys of the river Buzi. From 1880 Paiva d'Andrade has been exploring the lands which lie between the Zambeze and

the valleys of the Save and Buzi. In 1884-1885 Capello and Ivens travelled right across Africa from Mossamedes to the rivers Cunene, Cubango, Liambye, Lualaba, Luapula, Lake Bemba, and thence to the Zambeze, from near the mouth of the Kafue to the sea. In 1885-1886, Augusto Cardoso traversed from Ibo to the Nyassa, and thence by the Shiré to the Zambeze. In 1884-1888, Henrique de Carvalho and Sisenando Marques investigated the territories between the Kwanza and the Kassai in the districts of Lunda. These are the better known travels, but the Portuguese have undertaken very many less extensive but more minute explorations than these, which are almost entirely unrecognized, and cannot be mentioned in a brief abstract. They have thus covered with a work of uninterrupted investigation, from the sixteenth century up to the present time, almost all the more important regions of Africa which can be found between a line drawn from the mouth of the Congo to that of the Rovuma, and from that of the Cunene to the south of that of the Limpopo. Many explorations, exclusively scientific, more limited, and more delayed in their results, have been and still continue to be carried on. It was under the Portuguese Government that Welwitsch made his investigations and botanical collections in Angola (1853-60), which are amongst the principal bases of all that has been published on the Tropical African flora. In 1864-65, Pinheiro Baiaõ collected important zoological specimens in the districts between the Lucala and the Bengo in Eastern Africa, as did the two missionaries, Father Antunes in Huilla, and Father Barrozo in the Congo district. From 1864 José d'Anchietta has resided in the interior of

Africa, and thence has sent the notable investigations and magnificent collections, for the most part zoological, which so enrich the Natural History Museum of Lisbon (Eschola Polytechnica), and which, in part, have been studied by Professors Bocage (reptiles, birds, mammalia), J. A. de Sousa (birds), Felix Capello, Guimarens, Osorio (fishes and crustacea), Mattoso dos Santos (myriapoda), M. Paulino de Oliveira, A. Girard (insects), Count Ficalho (flora), etc., not to mention other than the principal Portuguese *savants*. From the said Anchieta are some recent geological researches upon the Angola formations; and upon his collections, those of L. Malheiro (1883), and those of other travellers, the investigations of Delgado, Choffat, and other geologists of the Lisbon Geological Commission have been founded. The principal and less known sources whence to study recent Portuguese explorations are: "Boletim e annaes do Conselho Ultramarino, Annaes maritimos e coloniaes;" "Annaes da marinha Portugueza;" "Boletins officiaes da Provincia de Angola;" "Boletins officiaes da Provincia de Mozambique;" "Boletins (and other publications) da Sociedade de Geographia de Lisboa;" "Journal das Sciencias Mathematicas e Naturaes da Academia das Sciencias de Lisboa;" "Boletim (and other publications) da Commissão dos Trabalhos geologicos de Portugal;" "Memorias estatisticas das Colonias Portuguezas," by Botelho, Lopes Lima, Bordalo;" "As Colonias Portuguezas," etc.

KILIMANJARO.—Dr. Hans Meyer, who was baffled in his first attempt to climb the great African mountain, renewed the effort with complete success in October



last. He writes, in a letter printed in *Petermanns Mitteilungen*, 36 Band, I: "Purtscheller and I have climbed, in two ascents, to the highest point of Kibo, and solved the riddle of its crater;" and he has since described his adventures to the Berlin Geographical Society.

On this second expedition Dr. Meyer went provided with every aid that Alpine experience could suggest, and accompanied by Mr. Purtscheller, an Austrian, thoroughly at home among glaciers and mountain peaks. Two camps were established on the mountain, and a tent was pitched for headquarters on the "saddle-plateau," a little more than 14,000 feet above the sea. Provisions were brought to this point regularly from the lower camps, and Dr. Meyer acknowledges that, but for the help of the Pangani negro, Muini Amani, who cared for all their physical wants, it would have been almost impossible for them to hold out. Muini Amani was not their only African friend, and Dr. Meyer says very good things of a model black prince, the "amiable young Mareale," of Marangu.

For a belt of 3,000 feet in width below its middle, Kilimanjaro is covered on the south and east with unbroken forest, but the northern side is bare, except for bushes and grass.

The start for the crater was made between 2 and 3 o'clock in the morning with lanterns, for the night was pitch dark; and when, after groping and struggling over rocks and ice, the travellers reached the crater's edge, they saw that the highest part of the mountain lay to their left, and that they could not reach it in less than an hour and a half. The height at which they stood



was 5,800 metres (19,028 feet). After resting a day or two, they attacked the mountain on the other side, and climbed every one of the three points into which the summit was there divided, and found that the one in the middle was between 15 and 20 metres higher than its neighbors. At a quarter past ten o'clock A. M., on the 6th of October, Dr. Meyer stood on this, "probably the highest point of German land," planted the German flag, and named the peak, "Kaiser Wilhelm-Spitze." It is 6,000 metres (19,685 feet) above the sea.

The crater of Kilimanjaro is circular, about 6,500 feet in diameter, and nearly 700 feet deep. At the bottom is a glacier, formed and supplied by ice and snow, and with an issue through a gap in the western wall of the crater. From this glacier flows the Weri-Weri river.

SIR HENRY YULE.—The death of Sir Henry Yule, on the 30th of December, 1889, is an irreparable loss to geographical literature. He had been in failing health for many months, and he was in his seventieth year, but his latest work showed no abatement of his powers, and it must be felt that he has died before the fulness of time.

Henry Yule was born on the 1st of May, 1820, at Inveresk, near Edinburgh. He went to India in 1840, served in the Punjab and in Burma, and accompanied Sir Arthur Phayre on a special mission to Ava. During the Indian Mutiny he was engaged on defensive works at Allahabad, Benares, and Mirzapore. He retired from the army in 1862, with the honorary rank of colonel, and was appointed, in 1875, a member of the

Indian Council. This position he resigned in the summer of 1889.

Colonel Yule was an indefatigable student and writer, especially devoted to the history and geography of Asiatic countries. Two of his works, "Cathay and the Way Thither," and "The Book of Ser Marco Polo," will always hold their ground, and of the Marco Polo it is not too much to say that no work of research and illustration in a similar field can be brought into comparison with it.

Equally remarkable for curious and recondite learning of another kind is the "Glossary of Anglo-Indian Terms," collected by Colonel Yule, with the aid, for a portion of the book, of Mr. Burnell.

This was published in 1886, and in the next two years appeared the three volumes of his last work, the "Diary of William Hedges," a Bengal merchant of the days when Englishmen had hardly begun to dream of an Oriental empire.

Two days before his death he was informed by telegraph of his election as a corresponding member of the Académie des Inscriptions et Belles Lettres. His brief reply, in Latin,\* is marked by a pathetic dignity and serenity of spirit: "I return thanks, most eminent sirs, for honors as much too great as they are undeserved. My strength leaves me, my life is failing, take, therefore, the will for the deed. A dying man, with a full and most grateful heart, bids you farewell."

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\*Reddo gratias, illustrissimi domini, ob honores tanto nimios quanto immeritos. Mihi robora deficiunt, vita collabitur, accipiat voluntatem pro facto. Cum corde pleno et gratissimo moriturus vos, illustrissimi domini, saluto.

*Publication du Ministère de la Marine. Memoire sur l'Abolition de l'Esclavage et de la traite des noirs sur le territoire portugais.*

*Lisbonne, 1889.*

*(from the Portuguese Minister at Washington.)*

This pamphlet of 100 pages is a temperate statement of facts concerning the attitude and the legislation of Portugal on the subject of African slavery. The reader is reminded, at the outset, of two points, much too frequently overlooked : that no white race is responsible for the existence of slavery in Africa, and that it was natural the first white slave-traders should be Portuguese, since Portugal was the first European Power to make discoveries along the African coast.

Like every other civilized nation, Portugal made gradual approaches to the idea of the wrong of slavery, but justly claims the distinction of having been the first to legislate on the subject. By successive decrees of March 20, 1570, Nov. 11, 1595, July 26, 1596, June 5, 1605, July 30, 1609, and Sept. 10, 1611, the Government forbade, in the name of the law of nature, the traffic in the natives of Brazil, and proclaimed them *free and equal to other men*. That precept and practice should have gone so far together and no farther may be a reproach to the Portuguese, but no other nation is in a position to make it. England has surely a right to be proud of her efforts in the present century for the abolition of African slavery ; but how long is it since slaves were advertised for sale in the Liverpool papers, and what is the right English word for negro apprenticeship ?

In 1835 Spain prohibited the slave trade under the Spanish flag, and in 1842 Portugal conceded the right

of search to the English cruisers. It must be remembered that Cuba and Porto Rico and Brazil offered the only markets to the slave-dealers, and it was, therefore, no more than natural that these should be for a long time Portuguese, or men of all nations sailing under the Portuguese flag. The importation into Brazil was forbidden in 1850, but the enormous profits tempted the traders to run the risk of capture. The English cruisers were the most active in the suppression of the trade, but the Portuguese did their part. The present pamphlet gives a list of 122 slavers captured by the Portuguese authorities in the fifty years from 1837 to 1888, on both coasts; and, taking into account the difference in the disposable forces of the two nations, England and Portugal, the lesser Power has no reason to be ashamed of the record.

It is often said that Portugal has not suppressed the slave-trade in her African colonies, nor among the tribes of the interior within the sphere of her influence, to use the phrase just now so much in favor. To this the Ministry of Marine and the Colonies makes answer that the suppression of the slave-trade in Africa is a task only to be accomplished in a long course of time, and remarks that even England, with all her sentiments of humanity and the great organization at her command, has not been able to destroy the slave-trade at Zanzibar, nor, according to trustworthy evidence, in Egypt, which is, perhaps, more directly within the sphere of her influence than South Central Africa is within that of Portugal.

It might have been added that Portugal has made no provision in any recent treaty like that in the convention

between England and Italy for excepting from search by the cruisers of the two nations, *in the Mediterranean Sea*, vessels supposed or reported to have slaves on board.

*Among Cannibals : an Account of Four Years' Travel in Australia, and of Camp Life with the Aborigines of Queensland. By Carl Lumholtz, M. A. With Maps, Colored Plates, and 122 Illustrations.*

London, 1889.

Mr. Lumholtz spent a year, from August, 1882 to July, 1883, in the valley of the Herbert River, which empties itself into the Pacific Ocean at about 18° S. Lat., among a race of people, whose culture, if they can be said to have any, must be characterized, he says, as the lowest to be found among the whole genus *homo sapiens*. Many of the Australian aborigines are cannibals, and most of the tribes have not yet emerged from the Stone Age in the history of their development. It has been Mr. Lumholtz's purpose to present in his book a faithful picture of the life, manners and customs of these aborigines from their birth and infancy to their old age and death ; and thus to rescue, for the science of ethnography, facts concerning tribes that have never before come into contact with white men, and that within a generation or two will have disappeared from the face of the earth.

The more closely his book is examined, the more it is felt that Mr. Lumholtz has thoroughly accomplished his purpose, with a conscientiousness that seems nothing less than heroic to the reader ; for of the native Australians, if of any men, it may be said in the words of the

English captain's report, that manners they have none, and their customs are beastly.

Nor was it only the disgust at the contact with such beings, offensive to every sense of the civilized man, that had to be faced ; the explorer's life was in continual danger.

The first caution impressed upon Mr. Lumholtz by the colonists was never to allow a black fellow to walk behind him. He was frequently in peril, not from strange blacks, but from the men who lived with him day and night and to whom he had shown all possible kindness. The natives were no less treacherous to each other than to the white man, and there is very little sign in the record of Mr. Lumholtz's experience of anything like a moral idea among them, with the single exception of their kindness to the sick, who are carried by their comrades from camp to camp.

There is a belief among them of the soul's existence, independently of matter, and a wide-spread fear of the spirits of the dead, though there is no dread of the spirits of those long since departed. It has happened that the savages have supposed white men to be their own deceased fellows ; and this seems to imply a belief in a future life.

No ideas of divinity are attached to the sun or the moon. On one occasion, when the full moon rose over the palm forest, Mr. Lumholtz pointed to it, and asked his men : "Who made it ?" They answered : "Other blacks." The same answer was returned when he asked who made the sun. He found no trace of myth or legend among the blacks of Herbert River ; but they were close observers of the starry heavens, and he



was surprised to find that they had different names for the planets.

In other parts of Australia the natives have imagined some very strange and beautiful myths of the stars. The Herbert River savages seem to believe in a demon, though Mr. Lumholtz was unable to get a definite account of this being. None of the Australians practice idolatry or offer sacrifice, and they have not been known to pray.

Mr. Lumholtz made extensive zoological collections and brought home, besides reptiles and batrachians, fishes, and insects, 700 specimens of birds. He discovered also four new mammals, viz. : three opossums and the tree-kangaroo, *Dendrolagus lumholtzii*, named for him by Professor Collett.

It ought to be said that "Among Cannibals" is one of the most interesting and valuable of recent contributions to the literature of travel and exploration, and that the author's English, for which he asks the indulgence of his readers, may stand upon its merits.

*Around and About South America, Twenty Months of Quest and Query. By Frank Vincent. With Maps, Plans and Illustrations.*

*New York, 1890.*

*(from the Author.)*

In this volume Mr. Vincent has aimed "to grasp salient features and emphatic characteristics, and to delineate them with a careful conciseness that shall beget a correct and lively general impression;" and it must be admitted that he succeeds in interesting his readers.

He tells his story in a straightforward way, bringing in, without any attempt at fine writing, the scenes and the incidents that attracted him. He visited the capitals, the chief cities and the seaports of all the South American countries, made expeditions into the interior of Brazil and the Argentine Republic, and ascended the Paraná, the Paraguay, the Amazon, the Orinoco, and the Magdalena. Not many men can hope to see more of a great continent, or to enjoy more thoroughly what they see, than Mr. Vincent does. He is frequently stirred to eloquence, as in describing the sunset view of the Andes from the harbor of Valparaiso: "The clouds lay lightly upon parts of the range, but Aconcagua towered apparently twice as high as the others, quite above the clouds, solitary, peaked, and serrated. . . . As the sun dropped into the dark ocean, the mountain range, the earth whence it arose, and the firmament into which it soared, combined to form a most enchanting spectacle. The jet black of unlit peaks, low down, contrasted with the brilliant purple of illuminated ridges, higher up, and these, again, with the vast snow-fields, changed into a sea of flame by the expiring rays."

Mr. Vincent has a great admiration for Dom Pedro II. (to whom the book is dedicated) and for Guzman Blanco, and he takes the statues of the latter, in and about Carácas, for genuine tributes of affection and respect from the hero's countrymen. It is not only in Venezuela that Mr. Vincent falls into the sin that doth so easily beset the tourist. He utters himself on matters political and social in every South American country with more confidence than knowledge. He speaks of the "demon of assassination always hovering" over

South American presidents ; but of what country were Lincoln and Garfield ?

He has a gift for inaccuracy, as well as for wild statement. The Peruvian *sol*, he says, is worth five cents, or about one-fourteenth of its real value ; the first island discovered by Columbus was Watling Island, though Mr. Vincent is the only man who can be sure of it ; and in the crypt of the Cathedral of Lima he finds the embalmed remains of the great Francisco Pizarro, " transferred from the old cathedral, which was built on the same site in 1607 by the valiant *conquistador* himself ; " who was killed, strangely enough, in 1541.

What Mr. Vincent calls " the most important, as it was certainly the most interesting, event " of his entire tour, was the exploration of the " Daly Falls," on the Iguazú river, twenty miles from its junction with the Paraná. To quote his own words : " Several of these falls have, at various times, received local titles other than the ' Falls of the Iguassu ' (*sic*), but no specific name, recognized in maps or books, has ever been given them, notwithstanding that they are almost rivalled farther up the river. I therefore assume the explorer's privilege of naming them Daly Falls, in honor of Charles P. Daly, LL. D., the learned and genial President of the American Geographical Society."

The great Fall of the Iguazú has been known for at least a hundred years by the name of the Salto de Victoria,\* and Mr. Vincent has assumed a good deal of privilege for a very little exploration.

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\* Se le dió el nombre Victoria (y no de la Victoria) porque los primeros españoles, venciendo mil dificultades, salvaron ese salto. (Mariano Felipe Paz Soldan, Diccionario Geográfico Estadístico Nacional Argentino, Buenos Aires,

He must have made other discoveries during his long journey, and he ought to have given, at least, a new name to the Rio de la Plata, or to the city of Buenos Aires.

*Carte de Madagascar, par E. Laillet Ing<sup>r</sup> et L. Suberbie, Explorateurs de l'Ile, d'après leurs documents personnels complétés à l'aide des cartes de la marine et les itinéraires suivis par divers voyageurs.*

*Paris, Challamel et C<sup>ie</sup> 1889.*

*(from the Authors.)*

This map is in three sheets, on a scale of 1 : 1,000,000, and is a beautiful specimen of cartography. For the coasts the authorities are the French Marine charts for the northern part of the island, and the charts of the English Admiralty for the southern portion. The soundings are given in metres, at the level of low water.

For the interior of the island Messrs. Laillet and Suberbie have made their own explorations, without disdaining the help afforded by the work of others. Even with this help their map must be regarded as a sketch, and a contribution to the future map of Madagascar. As M. Gabriel Marcel has pointed out, in the *Revue de Géographie*, for January, it is only the province of Imerina that has been surveyed according to scientific methods; a space, that is to say, of less than 10,000 square miles, or about one twenty-third part of the whole country.

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1885; p. 447.) "The name Victoria (and not de la Victoria) was given to it, because the first Spaniards, after surmounting a thousand difficulties, passed over that fall."

The details of the map do not inspire confidence. The names, with which the east central region is crowded, appear in some instances to have lost their way, and to be without earthly ties. A little to the N. W. of Tananarive are Antaramanana and Ambohimanga, of which it is impossible to say whether they are meant for villages, or rivers, or mountains ; and Ambohimena and Anzavona, farther to the north, are in the same friendless condition.

The elevations marked, even if not absolutely correct, cannot be greatly in error, and they are not lavished ; but some of the legends might have been omitted with advantage. It does not give much light to read in one place without sign of habitation : " Many settlements of intelligent people " ; and in another stretch of country : " Fragments of epyornis eggs."

A very high value is set upon the work of Messrs. Laillet and Suberbie in an *Essai sur la Cartographie de Madagascar*, par M. de Bassilan, Paris, A. Challamel, 1890.

This essay assigns the oldest map of the island to *Edrissi*, in the year 1153.

Next to him comes, in the year 1300, *Hereford*, who " vaguely indicates on his map the position of the island." This vagueness is the more reprehensible that Hereford is a cathedral, and ought to have set an example of high regard for the truth.

*Ruich*, who is generally known as Ruysch, did very little better in 1508 than Hereford two hundred years before, and there is not much to be said, it seems, for any of those who preceded Messrs. Laillet and Suberbie.

An interesting account of the patriotic and political

services of these gentlemen occupies about half of M. de Bassilan's essay, but does not lend additional weight to the authority of the map.

*Divisions, Subdivisions, Langues et Races des Régions Amhara, Oromo et Sidama, Communication faite par Jules Borelli à la Société de Géographie de Paris.*

(*From the Author.*)

M. Borelli, whose explorations in Shoa earned for him the gold medal of the Paris Geographical Society, presents in this Memoir the results of his observations in the regions named during the years 1885-1888. These results are classified and stated with great conciseness.

The Amhara, Oromo and Sidama countries have no precise limits, other than those of language. The regions in which the Amhara tongue is spoken are called by the collective name of Amhara; the Oromo are those in which the language is Oromo, and Sidama is the name given to the districts in which the speech is neither Oromo nor Amhara.

M. Borelli thinks it very probable that all the populations of Eastern Africa, north of the Equator, came from the first Semitic races that crossed the Red Sea from Asia, and that the existing distinctions are varieties resulting from intermixture with the negroes.

A description of the basin of the Omo and its mountains, the highest of which, the May-Goudo, attains an elevation of 11,150 feet, is followed by vocabularies of the Kouollo, Tambaro and Hadia tongues; and a tabulated summary of levels, altitudes and astronomical observations fills the final sixteen pages of the memoir.



## TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

BRUSSELS.—*Le Mouvement Géographique.*

Geographical Discoveries of the Stanley Expedition—Second Letter from Stanley—Ascent of Ruwenzori—Copper Mines of M'Boko Songho—Missions of the Congo Region—The Exploration of the Mongala River—M. Dupont's Book on the Congo—The Anglo-Portuguese Conflict—The Congo Railway—From the Niger to the Gulf of Guinea (Captain Binger)—Belgian enterprises on the Congo—The Exploration of the Lomami by Gov.-Gen. Janssen—The Loképo Exploration (Lieutenant Bodson).

EDINBURGH.—*The Scottish Geographical Magazine.*

Anniversary Address—Africa; British and other Spheres of Influence, by General Sir Lewis Pelly, K.C.B., K.C.S.I., M.P.—Letter from Mr. Henry M. Stanley to the Royal Geographical Society of London and to the Royal Scottish Geographical Society—The Kara Sea and the Route to the North Pole, by Capt. A. Hovgaard, Danish Navy—The Evolution of Climate, by Prof. James Geikie, LL.D., D.C.L., F.R.S.—The Physical Basis of Political Geography, by H. J. Mackinder, M.A., Reader in Geography, University of Oxford—Around and About Armenia, by Col. Mark S. Bell, V.C., A.D.C., R.E.—The Wall of Derbend, by the Hon. John Abercromby—The State of the Active Sicilian Volcanoes in September, 1889, by H. J. Johnston-Lavis,

M.D., M.R.C.S., B.Sc., F.G.S.—The Kirghis and Kara-Kirghis.

GENEVA.—*L'Afrique Explorée et Civilisée.*

Monthly Bulletin—Chronicle of Slavery—Stanley and Emin—The Latest Discoveries of Stanley.

GOTHA.—*Petermanns Mittheilungen.*

Ethnography of the Peloponnesus—Dr. K. W. Schmidt's Travels in the Western Comoro Islands—The Ascent of Kilimanjaro—Report on Posselt's Journey to Simbabwe (Matabeleland)—The Berbers of Morocco—Binger's Journey to the Ivory Coast—An Important Indian Treaty (for cession of lands in Northern Minnesota)—New Map of the Balkan Peninsula (Stieler's)—The Ugueno Highland and Western Kilimanjaro—Flinders Petrie's Excavations in the Fayum—New Map of Italy (Military Geographical Institute, Florence)—The Population of Greece—Earthquakes in Greece and Turkey in 1889.

LISBON.—*Sociedade de Geographia de Lisboa, Boletim.*

In Cubango (South Central Africa)—A Campaign in Bire—Relations of Portugal with Siam and Alliances of this Country with Foreign Powers—Campaigns in the Region of the Zambezi—The Cutting of the Isthmus of Panama in the XVI Century.

LONDON.—*Royal Geographical Society, Proceedings.*

The Bahrein Islands in the Persian Gulf—Progress of the Russian Expedition to Central Asia under Colonel Pievtsoff—The Great Central Asian Trade Route from Peking to Kashgaria

—Mr. J. R. W. Pigott's Journey to the Upper Tana, 1889—The Chinde River and Zambezi Delta—A Recent Journey in Eastern Mashona Land—A Journey through the Country lying between the Shire and Loangwa Rivers—A Visit to the Newly Emerged Falcon Island—The Russian Expedition to Central Asia under Colonel Pievtsoff.

MADRID.—*Sociedad Geográfica de Madrid, Boletín.*

Memoir on the Geographical Progress of the Year (D. Martin Ferreiro)—Ethnographical Vademecum of the Philippines (Blumentritt)—The Books of Columbus—An Unpublished Atlas of Juan de Oliva, 1592 (D. Cesáreo Fernández Duro)—The Province of Nueva Écija, in Luzon (D. Joaquín Rajal)—A Prehistoric Monument: The Statues in the Valley of San Agustín, in Colombia—Magnetic Determinations in the Western Mediterranean—On the Mean Level of the Sea (M. Ch. Lallemant).

MANCHESTER.—*Manchester Geographical Society, Journal.*

Some Impressions of Morocco and the Moors (Jos. Thomson)—Prehistoric Chat Moss, and a New Chapter in the History of the Manchester and Liverpool Railway—Florida and the English—On the Teaching of Elementary Commercial Geography in Primary and Secondary Schools, and in a Minor Degree of Elementary Technical Instruction—Taranaki—Indian Railways and

British Trade—Cree Indians of Calgary—The Snow line of the Tatra Mountains.

PARIS.—*Société de Géographie, Compte Rendu.*

Geographical Notes on Russia, by M. Venukoff—Paul Venukoff's Excursion in the Mougodjar Mountains (Western Asiatic Russia)—The Explorer Camille Douls—Uganda and the Victoria Nyanza—Hypsometrical Map of European Russia—A Feudal Colony in America (French Canada)—Fournneau's Travels in the Ogowe Country—Nordenskiöld's Proposed Antarctic Expedition—Growth of the Neva Delta—The Tuareg Vistors to Paris—The Ascent of Kilimanjaro—The Unification of Time.

*Bulletin.*

From the Niger to the Gulf of Guinea, by way of Kong (Capt. L. G. Binger)—Cunani and the Mapa River (H. Coudreau)—From Seoul to Quelpaert and back by way of Fu-san, Won-san and Vladivostok (Chaillé-Long)—Basque Ethnography (H. de Charencey).

ROME.—*Società Geografica Italiana, Bollettino.*

Alvarez's Ethiopia—The Columbus-Toscanelli Letters and the Danti—Rivers, according to the Doctrines of Present Geographical Science (Prof. Porena)—Dr Ragazzi's Letters to the President of the Italian Geog. Society—Nerazzini's Abyssinian Itinerary—The Torrid Zone and the Cosmopolitanism of Man—Studies for the Columbus Collection—Letter of Baron C. Negri on Peru and Italian Science—Tiet-

kens's Explorations in Central Australia (Tr.)  
—Mercator and his Maps, a Memoir by Prof.  
M. Fiorini.

VIENNA.—*Mittheilungen der K.-K. Geographischen  
Gesellschaft.*

Montenegro—The Mountain Tribes of the Negros  
Island (Philippines), by Blumentritt—Ice  
peaks and Glaciers in the Sexten Dolomites  
(Tyrol)—The African Journey of Count Teleki  
—The International Geographical Congress of  
1889—The Colossal Globe on the Champ de  
Mars, in Paris—The Provinces of Shirvan,  
Chisan and Tatik—The Present Position of  
Official Cartography in European States with  
especial Reference to Topographical Maps.

## WASHINGTON LETTER.

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WASHINGTON, MARCH 19, 1890.

CONFERENCE OF AMERICAN NATIONS.—The Conference of American Nations which began in January is practically at an end. Although newspaper reporters and the public were not accorded attendance, it is understood that a vast amount of valuable information was gathered, and that the discussions, as might have been expected from the distinguished composition of the body, were of a very high order.

It will not be a difficult matter to summarize the conclusions of the conference. Reports have been made and adopted on the subjects of railroads, weights and measures, sanitary regulations, international law, patents and trade marks, arbitration, steamship lines, etc. As to coinage there will hardly be an agreement, because the South Americans favor unlimited coinage and the United States membership on the committee is divided, Mr. Estee of California favoring unrestricted silver coinage, and Mr. Coolidge of Massachusetts opposing it. More discussion and longer sessions have been devoted to the consideration of a customs union than to any other subject. The difficulty in agreeing to a report is due to the rival interests of the nations concerned. The Spanish-American governments derive their revenues from taxing imports and exports. They levy duties on all we send them, while we admit free 80 per cent. of what we get from them. Certain articles, such as flour,



provisions, clothing, petroleum and lumber, which those countries do not produce, they are willing to admit duty free or for large reductions if we, in return, admit free their sugar and carpet wool. The United States member, Mr. Henderson, is willing to concede free sugar but not free wool. The majority of the committee believe that the principle of unrestricted reciprocity is acceptable, and that its adoption would, in all probability, bring about as favorable results as those obtained by free trade among the different States of this Union. A customs union on this basis, however, they deem impracticable as a continental system, at present. But if it is not easy to arrive at once at unrestricted reciprocity, that end might be gradually obtained. The first step in that direction is the negotiation of partial reciprocity treaties among the American nations, whereby each may agree to remove or diminish its respective import duties upon some of the natural or manufactured products of one or more of the other nations in exchange for similar and equivalent advantages. If good results should follow, the number of articles on the free list might be enlarged from time to time. Therefore the majority proposes ; "To recommend to such of the governments represented as may desire partial reciprocity, to make commercial treaties with one or more of the American countries, upon such a basis as may be acceptable in each case, taking into consideration the special situation, conditions and interests of each country." The minority presented a report stating that the committee had been unanimous in advising the Conference to reject the idea of a customs union.

The report on the project of a railroad down the back-bone of the hemisphere is the only one adopted without amendment. The first proposition is that a "railroad connecting all or a majority of the nations represented will contribute greatly to the development of the moral relations and material interests of said nations." The second: "That the best means adapted to begin and carry out its execution is the appointment of an international commission of engineers to study the possible routes, determine their true length, estimate their respective cost, and compare their reciprocal advantages." Other propositions follow relating to the composition of the commission, routes, use of existing railways, proposals for and expense of surveys and construction, subsidies, cessions of lands, or guarantees. Of course this railway along the Cordilleras and Andes would develop the Latin Americans more than anything that has been devised. But it would extend our trade relations, increasing the market for our goods and bringing to us the products of far away democracies—the guano of Peru, the gutta percha of the Amazon, the coffee of Maracaibo and innumerable articles from every country south of the Gulf.

The committee on Communication on the Atlantic recommend the establishment of subsidized fast bi-monthly passenger, mail and freight steamer service between the United States and Rio de Janeiro, Montevideo and Buenos Aires; also an auxiliary bi-monthly freight line. The contracting governments to contribute to the fast lines in the following proportions: The United States 60 per cent.; the Argentine Republic, 17½ per cent.; Brazil, 17½ per cent.; Uruguay, 5 per cent.

Contracts for the service to be solicited by advertisements in papers in each contracting country and in awards due consideration to be given to existing contracts with Brazilian lines. In consideration of the higher aid to be paid by the United States, the contracting parties are to accept only vessels constructed in this country. The committee also recommends the encouragement of direct cable lines to connect the countries interested, with a good telegraphic service at equitable rates.

On the subject of patents and trade-marks the committee finds in the three treaties on copyright, trade-marks and patents subscribed to by the representatives of the seven South-American republics, who attended the recent congress of Private International Law at Montevideo, the principles which, in its opinion, should be adopted throughout this continent. In the treaties referred to, literary and artistic works, trade-marks and patents of invention are clearly defined; in the same manner are prescribed the rights of authors and artists, proprietors of trade-marks and inventions, which the contracting parties guarantee and protect; the formalities to be observed in obtaining this protection and guarantee; the limits of said rights, and the manner in which they may be exercised. In respect to literary and artistic copyrights it is provided that authors and artists shall enjoy the rights accorded them by the law of the State in which the original publication or production of their works took place; but that no State is obliged to recognize such rights for a longer time than that allowed to authors who obtain the same right in that State. Rights to trade-marks granted in one country are recognized in the others, but with due regard to their own laws; and

to enjoy the right to an invention for which a patent has been obtained in any one of them, it is necessary to have the patent registered in any other in which its recognition is asked for in the form prescribed by its laws. With regard to the duration of patents the same principle is established which was previously mentioned in relation to literary and artistic copyrights, and it is moreover provided that the duration of the patent may be limited in each State to the period prescribed by the laws of the State in which the patent was first granted, if such period be the shorter. It is also provided that questions arising on the priority of inventions shall be settled according to the date of the application for the respective patents in the country where they were granted.

The report of the Committee on International Law, as adopted by the Conference, says: That the formulation of a code of private international law on civil and commercial matters would require more time and attention than can now be given to it. Its discussion would be a work of many months, and this, too, without any certainty that the end aimed at would be brought about, because, owing to the complexity of the subject, and to the number and closeness of its relations to the internal legislation of each country, it would not be easy to reach off-hand an accurate conception of what the common interests demand. Fortunately the committee has found ready at hand as distinguished and complete a presentation of the subject as could be desired. That presentation is embodied in the treaties of civil and commercial law sanctioned by the South American Congress of private international law at Montevideo in 1888-89. The amplitude of the discussions had in that Congress,

the minute and careful study of every point and detail involved, the intelligent consultation and laborious study, which the reports and discussions show to have been bestowed upon the works of the most distinguished European and American writers, the just appreciation with which it has met, and, above all, the circumstance that it has already secured the adhesion of seven of the American nations, have powerfully influenced the committee in favor of embodying the work in question as the substance of what is to be recommended. The committee therefore submitted and the Conference adopted the following resolution: *Resolved*, That the governments represented in this Conference which as yet have not adhered to the treaties of private international law, civil law, commercial law, and law of proceedings adopted at the Congress which met at Montevideo on the 25th of August, 1888, be and they are hereby recommended to cause said treaties to be studied so as to render themselves able, within the year to be counted from the date of the termination of the labors of this Conference, to declare whether they do or do not adhere to the said treaties, and whether their adhesion to the same is absolute or qualified by some amendments or restrictions.

The sanitary measures recommended are those adopted by the Sanitary Congress of Rio de Janeiro in 1887 or the Congress of Lima in 1889.

The committees on postal and cable communication, on port dues, extradition, and banking have prepared reports which have not yet been conclusively acted upon.

It is one of the noblest outcomes of the Conference, and its best claim to remembrance by after times that it

seems to have provided a plan of arbitration between the nations of the hemisphere which will aid in putting a stop to the numerous costly wars between neighboring republics.

BULLETINS OF COAST AND GEODETIC SURVEY.—Mr. Charles A. Schott, assistant, etc., U. S. Coast Survey, has prepared tables\* of the approximate times of culmination and elongation of the Pole-star and of its azimuth at elongation at any time between the years 1889 and 1910 for any place within the United States between latitudes  $25^{\circ}$  and  $50^{\circ}$  north. These tables are designed for the use of the surveyor, to facilitate the determination of a meridian line and of the magnetic declination (variation of compass) by simple instrumental means and by a method easy of application.

Two other Bulletins are announced, but not yet published, viz.: No. 16—Description of two new transit instruments for longitude; constructed at the office of the Survey from designs by Edwin Smith, assistant. No. 17—The relation between the metric standards of length of the U. S. Coast and Geodetic Survey and the U. S. Lake Survey. By C. A. Schott and O. H. Tittman, assistants, etc.

Professor Mendenhall, Superintendent, has under consideration a re-determinaton of trans-Atlantic longitudes, making use of the new Mackay-Bennett cables.

WEIGHTS AND MEASURES.—*Tables for converting customary and metric weights and measures* is the title of a handy publication issued by the Coast Survey. It covers linear, square and cubic measures, and those of capacity and weight. One table converts customary

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\* Bulletin No. 14, U. S. C. and G. S.



measures into metric, and the other reverses this order. It contains also such units as the chain, square mile, fathom, nautical mile, the English gallon and bushel, etc. The tables are arranged so that any unit from 1 to 9 can be converted by inspection into metric or customary measures. Foot notes give considerable data relating to the standards of measurements in the United States.

*The Verification of weights and measures* is the subject of Bulletin No. 15 of the U. S. Coast and Geodetic Survey. The paper is written by Mr. O. H. Tittman, assistant, etc., and is intended to convey information to those who wish to have their length measures verified, or who desire a comparison of their weights and capacity measures. The paper is prefaced by a brief account of the circumstances which attended the construction of the National prototypes of the metre and kilogramme.

MAGNETIC CHARTS.—The United States Coast and Geodetic Survey has recently issued four magnetic charts, viz., (1) chart of annual change of the magnetic declination for the epoch January, 1890. (2) Isogonic chart of the United States for the epoch 1890. (3) Isogonic chart of Alaska and adjacent regions for the epoch 1890. (4) Chart of the magnetic meridians of the United States, for January, 1890, and the present annual change of the declination.

These charts will form part of the illustrations for the Annual Report of the Survey for 1887-88\* and 1888-89. The first will accompany the 7th edition of an article entitled "Secular variations of the magnetic declin-

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\* Now passing through the press.

ation in the United States," etc. Since the last publication of this valuable paper in the Report of 1886, its contents have been enriched by the addition of 174 observations made at 15 (new) stations, and the tabular results have been brought up to date with predictions of the variation of the compass, at 109 principal places, extending to the year 1900. On this chart we find also delineated the positions of the line of no variation, the so-called *agonic* line, for the epoch 1797-1803, when at its extreme north-eastern position, for the epochs 1850, 1875 and 1890, thus exhibiting the progressive long period change in the direction of the needle. Two shaded lines or regions, one passing over Nova Scotia, the other skirting our Pacific Coast, indicate the positions where at the present time the needle is stationary and about to *reverse* the direction of its motion.

The second and third charts, as well as the fourth chart will accompany the second edition of the article "Distribution of the magnetic declination in the United States for the epoch 1890." The large number of observations collected from all sources, together with the Survey's own work since the appearance of the first edition in the Report for 1882, and in particular the late advance made in our knowledge of the secular change, called for an early issue of these charts for which the office has great demand. The larger of the two charts brings out in much detail the local deviations from the regular distribution of magnetism, and is of special interest to the surveyor; the smaller one will be appreciated by the navigator. To give an idea of the richness of the material, it may be stated that this edition embraces 900 new stations, and gives the declination, ob-

served and reduced to epoch, for nearly 3,237 places, of which 652 are beyond and near our boundary. It is by means of these charts and from the extensive tables by the aid of which they had been constructed, that the Survey supplies on its maps and charts for the time of publication, the declination or the variation of the compass, together with the annual change to be applied in order that the information may be brought up to any later date.

The last of the four charts mentioned is supposed to be the first one of its kind especially constructed for the area of the United States. It also presents certain selected curves of equal dip of the magnetic needle and of equal intensity of the horizontal component of the magnetic force. This last element has of late years come into demand in connection with the rapid development of applied electricity. The magnetic meridians exhibit directly the direction of the horizontal part of the magnetic force; in other words they give the direction of the pointing of a compass needle at any position of the line. These curves thus represent a physical fact and are of theoretical interest, whereas, the isogonic curves, from which they were directly derived, are wholly artificial, but specially fitted for practical use.

These charts are handsomely got up, and much of their clearness is due to printing in two colors, the body or topographical part being in a light blue, and the magnetic part of the information in black.

SIGNAL OFFICE.—The Chief Signal Officer has adopted a signal known as the "Information Signal," and forming one of the system of "Storm, cautionary and wind-direction signals." It consists of a yellow pennant of

the same dimensions as the red and white pennants (wind-direction signals), and, when displayed, indicates that the local observer has received information from the central office of a storm covering a limited area; dangerous only for vessels about to sail for certain ports. The signal will serve as a notification to shipmasters that the necessary information will be given upon application to the local observer. Also, the signal at night for indicating westerly winds is now a *white* light above a *red* light.

The Weather Code used for enciphering the telegraphic weather reports has been revised and is now thoroughly satisfactory. It is more economical by forty per centum than any code ever used, and it is so arranged that after learning the key the cipher can be translated at sight and with greater speed than has ever before been possible.

A paper entitled "*Preparatory studies for deductive methods in storm and weather predictions*," by Professor Cleveland Abbe, is a popular and non-mathematical exposition of the laws of storms, with a view to their better prediction, and, in connection with a study of their diurnal variations, to constitute a deductive method of storm predictions. Professor Abbe, who is the assistant of the longest experience in the Signal Service, brings together in this memoir many new results, together with principles and conclusions formulated by him since the publication in 1859 of the memoir by Ferrel, which is recognized as the beginning of modern dynamic meteorology. The paper appears as Appendix No. 15 to the Annual Report of the Chief Signal Officer for 1889. Appendix No. 25 of this Report contains a list

of errata furnished by Prof. William Ferrel, and supplementary to his paper, *Recent Advances in Meteorology*, published in 1885.

HARBOR IN GULF OF MEXICO.—The Board of Army Engineers, appointed to make an examination of the north-west coast of the Gulf of Mexico, west of  $93^{\circ} 30'$  W. longitude, and to report as to the most eligible point or points for an harbor to be of ample depth, width and capacity to accommodate the largest ocean-going vessels, and the commercial and naval necessities of the country, report, after an application of such severe tests, that Galveston harbor is the only one which may be made to fulfil all the requirements of the Act of Congress; but commend, nevertheless, the harbors at Sabine and Aransas passes as being worthy of great consideration and of vigorous prosecution of the works of improvement.

COLUMBIA RIVER.—Major W. A. Jones, U. S. A., supplies some geographical details of an undeveloped but remarkably fertile portion of the Northwest, in a recent "Report of the examination of the upper Columbia River." He says: "The Columbia River crosses the international boundary  $26\frac{1}{2}$  miles west of the boundary between Washington and Idaho Territory, and after flowing through mountainous country for a distance of 106 miles in a direction a little west of south, it enters the great plain supposed to have been occupied by an inland sea for a long period subsequent to the lava flows, which cut off the main drainage through the Cascade Mountains. Immediately upon entering this basin it trends directly to the west along the northern border of the great plain for a distance of



105 miles, when it strikes the foot of the hills of the Cascade Mountains and is turned to the south along the western confines of that plain. This is one of the two big bends of the Columbia River, and that portion of the great plain enclosed between its two arms is widely known as the Big Bend country. It is remarkable for its fertility, and requires no irrigation, but is absolutely destitute of springs of running water. There is little doubt, however, that water will be found abundantly by boring through the rock strata. Through this country the river is very new, geologically, and flows in long reaches at a level of several hundred feet below that of the plateau it incloses. It is still rapidly carving its way through the unstable lavas and basalts which generally form its bed. But the places where the waterway has not yet been cut out sufficiently to allow the river to pass through freely are very numerous. These are the places where navigation is obstructed by rocks and rapids.

YUKON RIVER.\*—In previous letters to the BULLETIN mention has been made of the preliminary survey of the frontier line between Alaska and British Columbia along the 141st meridian of west longitude, at or near where it crosses the Yukon River. It will be remembered that the Superintendent of the Coast Survey, early in the summer of 1889, organized two parties at the instance of the Department of State, with Capt. J. E. McGrath and Mr. J. H. Turner, officers of the Survey, in charge, to establish points on the Yukon and Porcupine rivers. As these parties did not altogether succeed in reaching their destination before the close

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\* See map at the end of Bulletin.



of the season, no reports other than those of the itinerary have been received.

Through the courtesy of the Superintendent, the Director of the United States Geological Survey was invited to send a representative with the surveying parties for the purpose of making geological observations in Alaska. Mr. Israel C. Russell, geologist of the survey, was assigned to that duty, and his "Notes on the Surface Geology of Alaska"\* present the earliest scientific intelligence of that interesting expedition.

A glance at the contents of this paper reveals a wealth of information skilfully presented. The time spent in Alaska by Mr. Russell was about three months, during which he travelled about two thousand five hundred miles. He entered the country from the west coast *via* St. Michaels, and left it from the south-western coast *via* Lynn canal and Juneau. After reaching Fort Yukon he proceeded up the Porcupine River, but afterwards returned to Fort Yukon and continued the ascent of the Yukon to the mouth of the Pelly River. He journeyed in an open boat up the Yukon to the mouth of the Lewes, ascended that stream, passing through lakes Labarge, Tagish, Nares and Bennett to Lake Lindeman, crossed the Chilkoot pass on foot and reached the head of Taiya inlet, the extreme northern reach of Lynn canal.

The interior of Alaska, that is to say, the vast territory lying to the south of the Yukon River, while it is known to be of value on account of its deposits of gold, copper and coal, is practically as unexplored as the "dark

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\* Bulletin of the Geological Society of America, vol. 1, pp. 99-162, March 13, 1890.

continent." The two great enterprises which Mr. Russell thinks would greatly assist its settlement are (1) a survey of the Yukon delta, which would determine whether there is a channel by which ocean-going vessels can enter the river; and (2) a survey of the passes between the head waters of the Yukon and the coast. This would furnish the needful data for making trails and wagon roads from the sea-shore to the head waters of the great river system of the interior. There are four passes more or less practicable for this purpose, none of which have been surveyed. Mr. Russell is of opinion that the Taku pass, though not the shortest, is the most practicable.

The part of the paper which will most interest geographers is the author's proposed change in the nomenclature of the Yukon River. In writing about this river and its tributaries an unfortunate confusion in names is met. The early voyagers entered the country from the West and from the East, and ignoring aboriginal names applied different ones to the same head waters. When the connection of these fragmentary explorations was established a confusion in nomenclature resulted.

On the latest edition of the U. S. Coast Survey map the name Yukon is applied to the stream which flows from Lake Lindeman, or Crater Lake, and after passing through lakes Bennett, Tako, Marsh and Labarge is joined by the Pelly, Stewart and Porcupine rivers. Dr. G. M. Dawson, the eminent Canadian authority, claims\* that the extension of the name Yukon so as to include the stream flowing from Crater Lake does vio-

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\* Report on an exploration in the Yukon district, 1887.

lence to the nomenclature proposed by early explorers, and, moreover, does not conform to the geography of the region. Dr. Dawson and Mr. Russell agree that Crater Lake is not the main source of the Yukon, but one of its secondary branches. On Dr. Dawson's map, in the report already referred to, what is known as the Yukon on the U. S. Coast Survey map is divided into three portions. From the sea to the mouth of the Porcupine River the name Yukon is retained; from the mouth of the Porcupine to the mouth of the Upper Pelly it is called Pelly; thence to Tagish Lake it is called the Lewes. The main source of the Lewes is considered to be the stream which enters the Tako arm of Tagish Lake.

"To one ascending the Yukon from the sea," Mr. Russell says, "it is evident that no change of name should logically occur where the main stream is joined by the Porcupine, as there is no perceptible change in its character at that locality. The same is true when the mouths of Stewart River and Pelly River are reached." About 150 miles above the mouth of the Pelly, the mouth of the Tes-lin-too (or, "Hootalinkwa" of miners, or, "Newberry" of Schwatka) is reached. *This* stream, Mr. Russell thinks, is the continuation of the Yukon and should share its name. "It flows," he says, "through a continuation of the same orographic valley that is occupied by the Yukon (or 'Lewes') below its mouth, while the Yukon (of the Coast Survey map) or the Lewes (of Dawson's map) above the junction is but a tributary stream, coursing through a narrow and poorly defined valley nearly at right angles to the main line of drainage. It seems evident to me," he contin-

ues, "that no unprejudiced observer could examine the junction without concluding that the Tes-lin-too should be regarded the main drainage channel." Accordingly he adopts in the "Notes" the name "Yukon" for the river from the mouth to its source, the source being "in the as yet unexplored region draining into Lake Teslin." The name "Lewes" he retains "for the stream on which Lake Labarge and the numerous lakes higher up the same system are situated."

Dr. Dawson, while admitting that the Tes-lin-too occupies the main orographic valley above its confluence with the Lewes, considers, for reasons stated in his report, the main source of the Yukon to be the Lewes, and the source of the Lewes at the headwaters of the Hotalinqu River.

CRUISE OF THE "THETIS."—Commander Charles N. Stockton recently gave to the National Geographic Society an account of the cruise of the *Thetis* in Arctic waters during the summer of 1889. This cruise was remarkable in several respects. The *Thetis* reached Mackenzie Bay in British North America, being the first Government vessel to carry the American flag in those waters. She also made the long stretch from Mackenzie Bay to Herald Island and Wrangell Land in one season, never before done, and she was the first vessel of any kind to follow the entire main coast line of Alaska from Fort Tongas in extreme south-eastern Alaska, to Demarcation Point in the Arctic Ocean.

The steamer left San Francisco, April 20th, and reached that port again December 8th, 1889. St. Matthew Island was visited with a view of ascertaining whether there were any shipwrecked persons there, and

to verify the statements made upon the charts that it was infested with polar bears. Old traces of these animals were found in abundance, but no evidences of their present existence. "This island," said Captain Stockton, "is probably the southern limit of the solid ice in winter in that part of Bering Sea." The Siberian coast was next touched by the expedition in an effort to gather news concerning the fate of the whaling vessel *Little Ohio*, which has been missing since the previous autumn. Finding no traces the *Thetis* passed through Bering straits to the Arctic Ocean. At the native village of Point Hope, two whalers were met with and the information obtained that the *Little Ohio* had been wrecked at this point and that the survivors were at the village. These men were taken on board. Cape Sabine was reached July 27th. Near by was a coal mine where the *Thetis* had coaled the summer before and this mine was still being worked by the natives. In the vicinity also was a stream called by the natives the Pitswagea, and known to but few whites, and not set down on any chart or map. The river is very winding, its general course being north-west. Its length is estimated to be over one hundred miles. A remarkable ice cliff was found on this river about twenty-five miles from the mouth. The glacier faces southward, and gales have deposited particles of soil and débris of plant along with the seeds upon the surface of the ice to a depth of from four inches to a foot. In the summer the vegetation is warmed to life in a remarkably short time, and the brown coat left by the receding snow is almost miraculously transformed to a robe of green, studded here and there with bright polar flowers. The river is gradually cutting into the

glacier. During the summer the ice melts away, leaving the protecting soil above like the eaves of a house. When it protrudes too far for the strength of the grass roots, it topples over into the river. At the freezing in September icicles form from the overhanging sod to the river ice below, making a narrow portico four miles in extent.

Captain Stockton gave an account of the building of the house of refuge at Point Barrow and of the assembling of the entire fleet of whaling and United States vessels at this point. Forty-seven vessels carrying the American flag and manned by about 1,200 men, had gathered within sight of the most northerly point of the United States. The *Thetis* got caught in the ice a short distance east of Point Barrow and was forced to remain there for five days.

The best landmark found both in Bering Sea and in coming from the Pacific was Akutan Island and volcano. The top of this volcano, which is at times active, is generally obscured by clouds, mist and smoke; but this in itself, in connection with the strongly outlined sides of the island and lower part of the volcano, presents features that would not escape notice in any but thick weather. Port Clarence is the best harbor before reaching the Arctic, where no harbors exist west of Herschel Island. It is now used as a rendezvous for a large portion of the Arctic whaling fleet. Seven steam whalers, sailing whalers, one trading vessel and a bark were found here by the *Thetis* on the 11th of July, 1889. There is no native settlement of any size in the bay, but natives assemble here from the surrounding country and islands for trade with the whale ships. On the Siberian coast of Bering Sea, Indian point (otherwise known as Cape



Tchaplin) which is quite a rendezvous for vessels, is a long, low point of shingle and sand, extending several miles to the eastward from the mainland with bold water upon both sides. The native village is a large and prosperous one with a population of about 350. They seem to be Eskimo and closely allied to the natives upon the Alaskan side. They seem intelligent, bright traders, good whalers, and generally more prosperous than the Alaskans.

As a collateral to Washington notes on Alaska it may be mentioned that an expedition is being organized by prominent publishing companies in New York to penetrate the vast tract of unexplored country lying between the Copper and Yukon rivers in central Alaska. Considerable care is being given to the proper composition of the party. The officers of the United States Coast Survey are interested in the plans for the explorations and will give all possible assistance. The necessary scientific instruments will be provided by Professor Mendenhall, who will also provide transportation for the party on the Government steamer *Patterson* as far as Chilkat.

THE GULF STREAM.—Lieut. J. E. Pillsbury of the Navy has, at the request of Prof. T. C. Mendenhall, Superintendent of the Coast Survey, written him a letter setting forth his views on the subject of the Gulf Stream and its variations. He says:

“I think the Gulf Stream does change its position to a slight amount, but not in the arbitrary manner or to the extent stated by some of the newspaper writers of late. . . . While it is probably a fact that, as a rule, a current from the Equator is warm, and one from the

Pole is colder than the surrounding waters, it is not always the fact that the warmest flowing water is from the south, nor that the coldest is from the north. . . .

The mere presence of warm water does not necessarily show that a current exists, nor does a change in temperature show that there is a change in current.

. . . The Gulf Stream probably has a vibratory motion, as evidenced by our anchorages at No. 1 station off Hatteras and as previously noticed off Rebecca Shoal, Fla. Anchored there, on the northern edge of the stream, riding to the wind with a gentle current, the latter would suddenly become strong and swing the vessel until she was stern to the wind, to remain but a short time, and then the current becoming weaker the wind would gain the ascendancy. This was repeated a number of times. I believe that the daily volume of the stream varies but little except from that due to declination of the moon. Along the northern coast, however, it is not always on the surface, but is, from an unknown cause, overrun by other currents. I think that its track through the ocean is absolutely fixed by law, and that its vibration is periodic, although the limit of the periodic change may vary to a trifling amount. The generally accepted belief that a wind blowing across the current changes the position of its axis is, I am convinced, erroneous. Every temporary wind, however, does transport water (chiefly by means of waves) and with it goes its heat or cold. The fact of finding gulf-weed within a few miles of Nantucket light-ship does not so much prove that the current is nearer our shores as it does that winds have prevailed in the direction from which it comes. Its home is in the

Sargasso Sea, from which it is drawn by the winds and sea. A small amount finds its way into the Caribbean Sea through the Antigua Passage, but most of it passes north of the West Indian Islands. The break of the waves has more effect on its movements than a current, unless the latter is very strong, and in the Gulf Stream itself it is seen stretching in long lines in the direction of the wind and sea, and not in the direction of the current, except only in the case of a rip at the meeting of the currents. Anchored on the edge of Florida Reefs with a strong wind blowing directly from the Gulf Stream, which was only a short distance away, its clear blue water was driven by the sea and overcame the cloudy reef-water, but no current accompanied it. In Key West harbor the water is usually cloudy. A southerly wind will cause a sea that will carry the clear water inshore, even in spite of an ebb-tide. The wind shifting to the opposite quarter will at once alter it to milky whiteness."

COLON.—The collapse of Colon since the suspension of work on the Panama canal seems to be complete. Vessels are scarcely seen in the harbor, where a few months before they were obliged to anchor for days waiting for dock room. The consul at Colon says that forty towns had sprung up on the line of the canal in almost as many miles, and that the local traffic on the isthmus reached vast proportions. These towns were populated with energetic people from all nationalities. Wages were high and labor incessant, day and night. This local business on the line of the canal has vanished, and the rank vegetation of the tropics is hiding dredges, railroad trains and contractors' paraphernalia

which had been left on the line as if work were to be resumed on the morrow. Rents have fallen off five hundred per cent. and nearly two-thirds of the business houses in Colon are closed up. Transit traffic has not suffered.

Congress provided in 1889 for "the repatriation of Americans who became destitute because of the collapse of the Panama canal." All who have applied for relief have been returned, mostly to New York.

BARRANQUILLA.—Mr. S. M. Whelpley, vice consul of the United States at Barranquilla, makes a strong claim for the commercial superiority of that city as against Carthagena, the capital of Colombia. The fame of the latter, he says, is largely due to its antiquity; and centuries of decay are plainly visible in the ancient buildings, walls and crumbling fortifications. Barranquilla is to the Magdalena River and its tributaries as New Orleans is to the Mississippi, the terminus and home port of all the largest class of river steamers, the chief port for entry and shipment, her merchants controlling, through their correspondents in the interior and abroad, at least three-fourths of the imports and exports from the interior States bordering the Magdalena and the Cauca rivers.

TALZERES ISLAND.—Talzeres Island, at the entrance of the Oronoco River, has been formed since the last survey of that river, and is not indicated on the charts. Situated eastward of the S. E. extremity of Cangrejo Island, it is about one and one-half miles in length in east and west direction, and covered with trees about twenty feet high. New islands are forming to the

northward and eastward of this one.—*U. S. Hy. Office, Notice to Mariners.*

PARAGUAY.—The recent land speculation in Paraguay has abated, and there is evident progress on the basis of real values. Roads are being improved, and bridges multiplied. The effort to diffuse popular education has not declined, the number of schools and attendance having greatly increased. Large amounts have been spent in the repairs of churches. Municipal improvements in Asuncion, such as pavements, new tramway lines, and electric lights are especially noticeable. Besides the five banks already existing, a new one has been created with a capital of eight million dollars, paper. It is authorized to issue notes to three times the amount of its paid-up capital, and besides its banking business will have a special section for encouraging colonization. Although the increase in immigration has been quite marked, much larger results are looked for. The Government has appropriated, to advance this object, four times the amount provided in 1888. The want of a direct communication with Europe is a serious obstacle in the way of the Government efforts to attract immigrants, and it is stated, moreover, that many who have this destination in view are met in Buenos Aires by agents of the Argentine immigration office, and induced to remain in the Argentine Republic. Several Americans who are now in Virginia are expected soon, accompanied by practical tobacco and cotton farmers with the best machinery. A land company has given land on certain conditions, and an effort will be made to make the venture successful.

Two new stations have been opened on the prolongation of the railway from Paraguari to Villa Rica, and the



entire line to Villa Rica is about completed. In March last the existing railway and the right to extend to Villa Encarnacion passed into the hands of London parties, and the stock of the company was subscribed for three times over. Plans have also been approved for the proposed line to connect Asuncion with Sucre, Bolivia, and it is reported that a company proposes to put on the river a special fast service of boats which will make the trip from Buenos Aires to Asuncion in three and a half or four days, instead of six or seven as at present.

SAMOA.—Commander Hunker, of the U. S. S. *Adams*, stationed at Apia, informs the Navy Department under date of December 30, 1889, that the affairs of the Samoan people seem to have been amicably settled, and that a large party of the most prominent of the opposition chiefs of Tamasese's party came to the official residence of Malietoa, and formally acknowledged their allegiance to Malietoa. The natives and foreign residents consider the peace of the country as assured, and the German authorities are so well convinced of this that they do not consider the presence of a war vessel now necessary at Samoa. The German cruiser intended to sail on the 20th of January for Auckland, New Zealand, to remain away until the end of the "hurricane season."

An account of the disaster at Apia, in the hurricane of March 15th and 16th, 1889, has recently been published by the Navy Department. The public is familiar with most of the details of this calamity, but the violence of the storm which sacrificed the lives of fifty-two brave seamen, and wrecked two steamships of the Navy is something that landsmen feebly appreciate.

Congress, by an act approved February 19, 1890,



made provision for the relief of the sufferers by these wrecks, by directing the payment to each survivor of a sum equal to the losses sustained by them, not to exceed the amount of twelve months' pay, and to the surviving families or dependents of those who were lost in the wrecks, or who have since died, a sum equal to twelve months' pay. Ten thousand dollars were also appropriated for the removal of the remains of deceased officers and seamen to the United States. The Navy Department presented the native chief Seumann, who assisted in rescuing the officers and crew of the *Trenton*, a double-banked whale-boat with fittings, and suitable rewards to the men composing his crew. And to Fugi Hachitaro, who saved the life of Lieut. J. C. Wilson of the *Vandalia*, the Treasury Department has awarded the gold medal of the Life-Saving Service.

IRON CHURCH IN MANILLA.—The Recoleta Brotherhood of the Catholic Church in Manilla, Philippine Islands, is constructing in the district of San Sebastian an earthquake-proof church. The entire frame-work is of wrought iron, bolted together in the firmest manner, the fluted columns and buttresses being hollow. The walls are of double plate iron with a space of thirty inches between the plates. The dimensions of the edifice are : length 162 ft., width 70 ft., height to the top of the arches 52 ft., and to the spring of the same 34 ft. Two towers are each 19 ft. square by 170 ft. high. The total weight of the iron in the building is 1,600 tons. The material was made in Brussels. Total cost, \$350,000. It is expected that this structure will defy the most vigorous earth-shaking.

SIAM.—A company has been incorporated to build at

once a railroad from Bangkok *via* the town of Paknam, at the mouth of the Menam, to Petriu, a distance of about thirty miles. It will be the first railroad in Siam and is to be built exclusively by Siamese capital. A corps of engineers is engaged in running a line northward towards Burma.

The city of Bangkok is to be lighted by electric lights. A company has been organized, and the plant is ordered and will be soon put in operation.

SCHWALBACH AND ZURICH.—It will interest Americans who resort to the baths of Schwalbach (or, Langenschwalbach as it is now officially called) for the treatment of nervous and other complaints, to know that this locality is now easy of access by reason of the opening of the new railway line from Wiesbaden.

The growth of Zurich as a tourist centre has been quite marked of late, the number of tourists registered during the season of 1889 being 123,587 as against 112,426 during the preceding year. The hotels at times were filled to overflowing. The French Exposition no doubt gave some impetus to this movement, but the large outlays made by the city in beautifying its lake-front, provisions for lake excursions, and special excursion trains to near points of interest and beauty, and the centring here of railway lines from Paris, Milan and Vienna, have had much to do with making Zurich one of the most popular and attractive resorts in Switzerland.

Among the great achievements of Swiss enterprise, during 1889, was the opening of the mountain railway leading to Mt. Pilatus, overlooking the Lake of Luzerne.

IRRIGATION.—The Government literature of irrigation has been increased by the publication in quarto form, of a translation of “Irrigation in Egypt,” by J. Barois, Engineer-in-Chief *des Ponts et Chaussées*. The work contains general information concerning Egypt and the Nile, the method of irrigation and description of irrigation works in Egypt, the method of elevating and using irrigation water, the construction and repairs of canals, dikes, etc.

Although basins of submersion form the traditional system of Egyptian agriculture, the practice of irrigation on a vast scale is of very recent origin. For this reason the methods are not yet well planned, and there did not exist, up to the present, rules properly established and sanctioned by long usage for the employment of the water for irrigation, for the rotation of crops on irrigated lands, for the drainage of the soil, and generally for everything which pertains to agriculture.

The publication, which is accompanied by twenty-three plates, was translated by Major A. M. Miller, U. S. A., and was ordered printed by the House of Representatives on account of interest now attached to the subject in this country.

Not less than thirty “irrigation bills” have already been introduced in Congress at this session. The special committee of the Senate appointed at the last session to investigate during the recess the matter of reclaiming arid lands by means of irrigation has a very voluminous report in preparation which will soon be submitted.

It is perhaps a misfortune that the introduction of this great work of water storage in Arizona should have

been deferred by the recent disaster at Walnut Grove dam. "This dam," says Lieut. Glassford of the Signal Corps, "is in the central part of Arizona, not far from Prescott, being about 4,000 ft. above the sea level and with a drainage of 150 square miles. The average rainfall in the mountainous region of the territory is about fifteen inches a year, and the least amount, ten inches, is sufficient to always keep full a reservoir of this kind, and while the dam was built for mining purposes only, the great question of water storage has since been made of such importance that as a secondary means of utilizing the water it had been proposed, and steps were being taken, to build flumes and ditches to the level land suitable for agriculture lower down in the valley of the stream."

COMPRESSED AIR MOTORS.—Mr. J. L. Rathbone, United States Consul at Paris, has made a careful examination of the system of compressed air tramway motors and of the Mékarski system of compressed air applied to locomotives, and demonstrates at considerable length\* the advantages of the systems as shown on roads near Paris. The report is technical, and accompanied by drawings. An engineer sent to Nantes to examine Mékarski's compressed air motor reported that "for economy, absolute safety, and ready management it is the best motor now known." H.

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\* United States Consular Report, February, 1890.





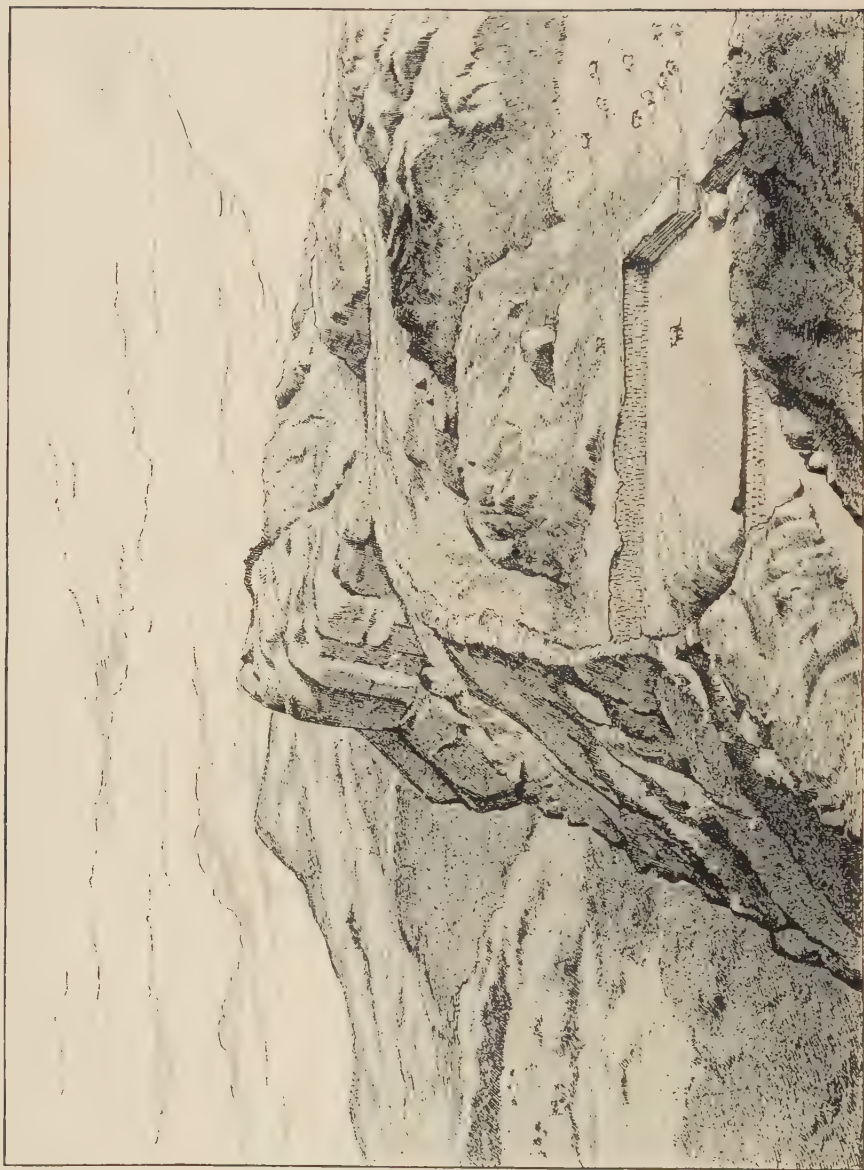












CASTLE-NICK—MILE-CASTLE, AND PART OF THE ROMAN WALL.

BULLETIN  
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THE ROMAN WALL IN BRITAIN.

BY

PROF. HENRY W. HAYNES.

To the educated American, upon his first visit to our ancestral home in England, the most fascinating objects his eyes rest upon unquestionably are her ivy-grown ruins, with their crumbling battlements and mouldering stones. He feels his youthful confidence, fostered by our untrimmed fields and shaggy forests, gently giving way to wholesome reverence, as his imagination wanders among these venerable relics of "a foregone world." But if Gothic Fane or Norman Keep, in their lovely ruin, whisper to his heart their message of soothing melancholy, how stimulating to his intellectual insight is his first glimpse at the mighty traces left upon the little island by the masters of the ancient world. It is of the most marvellous of these that I shall attempt to give a slight picture: and I will preface my account of it by quoting some fine verses about it contributed



more than half a century ago to *Blackwood's Magazine* :

"Where yonder reaching hill slopes boldly down,  
 Far-stretching eastward, with a long decline,  
 Stand where the cottages the summit crown,  
 \* \* \* \* \*  
 [And mark] that line of green that seems to sweep  
 Sheer forward on to the not distant deep ;  
 \* \* \* \* \*  
 What an unbending course it seems to keep !  
 \* \* \* \* \*  
 Here plant thy foot where many a foot hath trod,  
 Whose scarce-known home was o'er the southern wave,  
 And sit thee down ; on no ignoble sod,  
 Green from the ashes of the great and brave ;  
 Here stretched that chain which nations could enslave ;  
 \* \* \* \* \*  
 This shapeless mound, thou know'st not what to call,  
 Was the world's wonder once—this is The Roman Wall.

There was the deep-trenched Vallum—to the left ;  
 The Agger here ; o'er many a hill they went,  
 O'er many a stream ; through many a craggy cleft,  
 An endless and perpetual battlement.  
 And when the spring the frozen nations sent,  
 The restless Pict—, forth from his thawing snows,  
 This was his bound-stone, oft with blood besprent—,  
 Here, where the daisies settle, and the rose  
 Now trusts her tender leaves, and the shy violet blows."\*

"Few who have visited this district" says the learned historian of "The Romans under the Empire," "have resisted the contagion of the Wall-Fever, caught from the genial enthusiasm of the local antiquaries, the loving reverence of those who dwell beside it, and the three-fold interest derived from its bold design and execution, its much-contested history, and the romantic scenery with which it is surrounded."†

I propose first to give with some particularity an ac-

\* The Roman Wall—*Blackwood's Magazine* (Oct., 1822), vol. xii., p. 409.

† Charles Merivale. *Quarterly Review* (Jan., 1860), p. 123.

count of the origin and character of this great work, and of the conflicting theories that have been maintained in regard to the share taken by different persons in its erection. Here we encounter the confusing circumstance of having, in the words of Dr. Latham, "more builders than structures."\*

Then I shall endeavor to present a slight picture of its present condition and of what the inquisitive traveller will see as he strolls along its course. In doing this I shall have occasion to refer to some of the numerous discoveries that have been made during the progress of extended excavations carried on at several points along its line by Mr. John Clayton, of Chesters. These may serve to illustrate somewhat the character of the men, and the manner of their life, who for three long centuries, through summer's heat and winter's cold, kept ward and watch along its wind-swept battlements against the fierce barbarians of the North, struggling for their liberty with the mighty power of Rome.†

In using the term, "The Roman Wall," I wish to be understood to mean the great structure, drawn by the Roman conquerors across the northern part of England, from the mouth of the Tyne, at Wallsend, near Newcastle, on the east, to Bowness on the Solway, on the west; a distance of some seventy-three and a half miles. This work has always been called The Great Wall; while for the dwellers in its neighborhood it has usually gone by the name of The Picts' Wall.

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\* Smith's "Dictionary of Greek and Roman Geography," vol. i., p. 436.

† I wish to acknowledge, once for all, my great indebtedness to "The Roman Wall, a description of the mural barrier of the north of England, by the Rev. J. Collingwood Bruce, LL.D., F. S. A." (third edition, 1867), from which I have freely borrowed whatever seemed useful for my purpose.

But it must always be borne in mind, to prevent confusion, that the Romans also built another wall across the narrowest part of Scotland, a little to the north of Edinburgh and Glasgow, from Bridgness, on the Frith of Forth, to Dunbarton, on the Frith of Clyde. A few preliminary words of explanation about that structure seem to be required. The northern wall was made of earth only, and was about half the length of The Great Wall, some thirty-seven miles. It was built (A. D. 141) by Lollius Urbicus, legatus, or provincial governor, of Antoninus Pius, along a line of forts constructed by Agricola, sixty years previous (A. D. 81).<sup>\*</sup> Accordingly it is known to historians as the Wall of Antoninus; locally it has usually gone by the name of Graham's Dyke. Many modern historians are of the opinion that it was this wall, subsequently strengthened by Septimius Severus, during his famous campaign in Scotland (A. D. 208), which the later Roman writers have had in mind, when they have spoken of the Wall of Severus.<sup>†</sup> Very few traces of the Wall of Antoninus are still to be seen, and the principal interest attaching to it in recent times has arisen from the discovery about twenty years ago of an inscription which marked its eastern termination. It was that discovery which caused Sir Charles Lyell to retract his previously expressed opinion that there had been an elevation of the coast line of central Scotland, subsequent to the times of the Roman occupation.<sup>‡</sup>

Lest it may appear strange that the Romans should

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<sup>\*</sup> Capitolinus, "Vit. Antonini," 5.

<sup>†</sup> Mommsen, "Provinces of the Roman Empire," vol. i., p. 203; Skene, "Celtic Scotland," vol. i., p. 89, (*Note* 27); Elton, "Origins of English History," p. 325.

<sup>‡</sup> Lyell, "Antiquity of Man" (fourth edition), p. 55; following the authority of D. M. Home (Trans. Roy. Soc. of Edinburgh), vol. xxvii., p. 39.

have been at the pains to construct at separate times two different walls across one little corner of their domain, to mark the bounds of the empire, and to restrain the attacks of their unsubdued barbarian neighbors, it must be borne in mind that this was in precise accord with their habitual policy as displayed elsewhere. Julius Cæsar first drew a line of forts along the course of the Rhine, at the foot of the Jura range, in order to protect the Gallic province against the inroads of the Helvetii. After the conquest of Dacia by Trajan, a great earthwork, or Limes, afterwards strengthened in parts by Probus with walls of stone, was constructed from near Ratisbon, on the Danube, to the neighborhood of Cologne, on the Rhine.\* Throughout portions of this whole distance (variously estimated at from two hundred to four hundred miles), there still exist extensive remains, which go now by the name of *The Devil's Wall* or *The Heathen's Wall* (Heidenmauer). This, however, must not be confounded with another Heidenmauer, where Cooper lays the scene of his novel bearing that title, which is to be seen on the mountain near St. Odille, in Alsace, and which has probably come down from prehistoric times.

But of all the relics of Roman power anywhere remaining, of a similar character, the remarkable structure in northern England is on a much grander scale, and displays a far greater amount of labor and skill than any to be found elsewhere. The designation of *The Great Wall* is well deserved. It was the opinion of Horsley,

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\*Gibbon, "Decline and Fall of the Roman Empire," Chap. xii; Yates, "On the Limes Rhæticus and Limes Transrhenanus" (Trans. Archæol. Inst. 1852), vol. viii; Hodgkin (Archæologia Æliana, 1882).

by far the ablest of the earlier English antiquaries, and whom Bruce justly styles "the great Horsley," that this work also, as well as that in Scotland, grew out of a line of camps and forts built by Agricola.\* In the exquisite life of Agricola written by his son-in-law, the historian Tacitus, we are told about "two arms of two opposite seas which shoot a great way into the country, and are parted only by the strip of land which was covered by the Roman forts."† Plainly this refers to the line of forts in Scotland I have already spoken of, where The Wall of Antoninus was afterwards built. This was in Agricola's fourth campaign in Scotland, (A. D. 81) and marked the limits of the region he had secured. Afterwards, in two campaigns, Agricola penetrated still farther North, and defeated the Caledonians in that famous battle of Mons Graupius, which, by a mis-reading of the early editors was called Mons Grampius. That great conflict is memorable for the speech of Galgacus to his troops in which he tells them that the Romans "make a solitude and call it peace." Its site has always been a puzzle to the Scotch antiquaries, who have sought for it near the chain of the Grampian Hills, although the name of the Grampians is of no older date than the XIVth century.‡ Burton, the latest historian of Scotland, gives up in despair the problem of its locality.§

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\* Horsley, "*Britannia Romana*," p. 98.

† Tacitus, "*Vit. Agricolaë*," Ch. xxiii.

‡ Mackintosh, "*Hist. of Civilization in Scotland*" (vol. i., p. 94), gives the various sites that have been suggested:—Chambers and Gen. Roy at Ardoch; Gordon at Dalginross, in Perthshire; some in Fife; others at Urie, in Kin-cardineshire; and Skene at Cleaven Dyke, near the junction of the Tay and the Isla.

§ *Hist. of Scotland*, vol. i., p. 16.

But although there can be no question in regard to Agricola's northern chain of forts, Horsley's opinion, that he also built a second line across Northumberland, was based solely upon his understanding of another vague passage in Agricola's biography, in which we are told that "many states, that up to this time had been free . . . . were surrounded by posts and castles."\* In the light of the knowledge of Horsley's time, a century and a half ago, this opinion was, perhaps, not unreasonable; and it has been generally followed by the older school of English antiquaries, including Hodgson, in his elaborate and learned history of the county of Northumberland, published about forty years ago.† But it is no longer tenable in the light of recent explorations and discoveries; no inscription has ever been found along the line of the wall bearing a date earlier than the time of Hadrian, forty years later than Agricola's day; many of the stationary camps attached to the wall could only have been placed where they stand in order to accommodate the garrisons which were to man it; and this theory has been abandoned by Hubner, the editor of that volume of the great collection of Roman inscriptions, which is devoted to those found in Britain.‡ As Hubner is the latest authority, who has thoroughly investigated the question, this point may be considered finally settled. All that can be regarded as probable is that Agricola in his advance northward seized and fortified certain commanding positions, which afterwards fell in with the line of the wall.

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\* Vit. Agricolaë, Ch. xx.

† Hist. of Northumberland, vol. iii., part 2, p. 157.

‡ Corpus Inscriptionum Latinarum, vol. vii., p. 99.



Before considering the question, however, by whom these great works actually were constructed, it will be well to take into account the nature of the region they would have to traverse, as well as to describe with considerable detail their method of construction. From the Tyne to the Solway, in a direct line, is a distance of only about sixty miles, admirably adapted to fortification from the nature of the ground. The Tyne and the Eden, with their respective tributaries, rising together in the central portion of the island, fall to the east and to the west into deep trough-like valleys, whose northern banks have a considerable elevation. But between the headwaters of the south Tyne and the Irthing, a branch of the Eden, the land has been raised in some primeval convulsion of nature, and presents a formidable barrier of basaltic cliffs, facing to the North. Sometimes this has been styled the backbone of England. This natural barrier of cliff and stream, broken only at intervals by abrupt fissures, is of itself no slight obstacle to the approach of an enemy from the north, and it was rendered very difficult of passage by the system of fortifications adopted. If we study carefully the topographical conditions of the country through which these have been carried, it will become evident that they have been equally well designed as a protection against sudden surprise from the south. The natives of the region on that side of the wall, although conquered, were not to be trusted. In the event of their kinsmen in the north gaining an advantage over their invaders, they would have been prompt to avail themselves of it. This the Romans understood, and with characteristic prudence made themselves secure on both sides, by what was in reality

an intrenched camp, extending across the island, and fortified both ways.

The design of this great system of defences may best be made clear, if it be understood that it was made up of three essential and distinct portions. *First*, there was a wall of stone, or *mur*us, strengthened by a ditch on the northern side. *Second*, came a wall of earth, or *vallum*, uniformly to the south of the stone wall, consisting of three ramparts, separated by a ditch. *Third*, there was a series of stationary-camps, castles, and watch-towers, together with the roads for the accommodation of the troops who manned the wall. These roads were either between the *mur*us and the *vallum*, or to the south of them both.

All the works run from one side of the island to the other, nearly in a straight line, and for the most part in close companionship. The *mur*us and the *vallum* are generally within sixty or eighty yards of each other, although the distance varies according to the nature of the ground. Sometimes they are so close as barely to admit of the military way, while in one or two instances they are upwards of half a mile apart. They are most widely separated in the high lands of the central region. Here the stone wall seeks the highest ridges; while its usual companion, the earth wall, runs along the adjacent valley. Both works, however, are so arranged as to afford each other the greatest support which the nature of the country allows. The stone wall usually seizes those positions, which give it the greatest advantage on its northern side; the earth wall, on the other hand, is so drawn as to occupy ground that is strongest towards the south.

As before stated, the murus, or stone wall, extended from Wallsend, on the Tyne, to Bowness, on the Solway, a distance of seventy-three and a half miles; but the vallum falls short of this distance by about three miles at each end. The most striking feature of both is the determined manner in which they pursue their straightforward course. The earthwork actually makes fewer deviations from a straight line than the stone wall; but as the latter sometimes traverses higher ground, its tendency to adhere to a direct line is more conspicuous. Stretching along in its onward course the murus swerves from a straight line only to take in the boldest elevations; but if it never swerves except with this object in view, so it never fails to seize the highest points as they occur, no matter how often it is compelled to change its direction; never bending in a curve, but always at an angle. Hence, along the craggy precipices of the central basaltic ridge it is compelled to pursue a remarkably zigzag course, taking in every projecting rock. This mode of proceeding involves the accommodating of itself equally to the depressions of the mountainous region it traverses. Without flinching it sinks into each gap or pass, as it comes, and after crossing the narrow valley ascends unfalteringly the steep acclivity on the other side. At the river Irthing, in Cumberland, it met in its westward course a precipice of upwards of a hundred feet in height. It cannot now be ascertained whether it was carried up the face of the cliff or not, for the strata are of soft and yielding nature and are continually being eaten away by the river. Certain it is, however, that the stone wall, accompanied by its ditch, is still to be seen on the very brink of the cliff at its

summit. If it failed to climb this particular cliff, we are assured by Dr. Bruce that it is the only one in the course of the line from sea to sea, which it refused; and if it did ascend it, it must have more nearly resembled a leaning tower than a barrier wall. Naturally the question will suggest itself why it was carried along such precipitous crags, which might be deemed a sufficient protection of themselves. In Dr. Bruce's opinion the answer is two-fold; that the shelter of the wall was required in such places to protect troops, who came from warmer countries, from the bitter northern blasts during the winter months, when the hardy Caledonians were most accustomed to making their attacks; and that the cliffs alone would not have been sufficient to prevent such a bold and agile foe as the Scotch Highlanders from breaking through the barrier.

Thus far we have considered only general conditions common alike to both the main parts of the works. I will proceed to describe with more particularity the method of construction of the murus and the vallum.

For a distance of many miles west from Newcastle the present highway leading to Carlisle runs over what was once the stone wall. When General Wade was summoned from Newcastle, in 1745, to the defence of Carlisle against the young Pretender's forces, he was obliged to turn back at Hexham for the want of a road practicable for artillery, and only reached the western side of the island by a circuitous route, and after a month's delay. The consequence was that Carlisle fell into the enemy's hands, and a hostile force penetrated into the very heart of England. After the rebellion was quelled the government hastened to obviate the recurrence of

such mishaps, and it was determined to make a good road direct from Newcastle to Carlisle. General Wade was charged with the execution of the work; the same officer, whose subsequent exploits in road-making in the Highlands of Scotland gave occasion for the familiar jingle:

“Had you seen but this road before it was made,  
You would lift up your hands and bless General Wade.”

The method adopted by him may be clearly seen at the present day. “In dry weather, and particularly after wind,” says Dean Merivale, “we may trace at intervals in the centre of this road the facing stones of the wall *in situ*, lying in lines about nine feet apart, just where they rose above the foundations; while in many places the rough ashlar of its upper courses, thrown loosely down to the right and left, still crop up to the surface, not yet ground to dust by the wear and tear of almost a hundred and fifty years’ traffic.”

As in no part of its course at the present day is the wall entirely perfect, it is difficult to ascertain what its height originally was. The oldest writer who gives its dimensions is the Venerable Bede, whose Ecclesiastical History dates from A. D. 731. He lived in the monastery of Jarrow, anciently a part of the parish of Wallsend, and must have been familiar with the appearance of the eastern end of it at least. He says, “it is eight feet in breadth and twelve in height in a straight line from east to west, as it is still visible to beholders.” This description is probably as it appeared in his own neighborhood, where, in a flat country and on the border of a navigable river, we may naturally suppose it would have been liable to suffer spoliation. The next eye-

witness comes eight hundred and fifty years later. Sir Christopher Ridley, in a letter written in 1572, says "the breadth is three yards, the height remaineth in some places yet seven yards." Samson Erdeswick, who visited the western end of the wall on the Solway in 1754, says "the sea ebbeth and floweth there, and the wall beginning there, and there yet standing of the height of sixteen feet runs for almost a quarter of a mile together along the river side westward." Camden, who saw it in 1599, says that at a place now called *Caer Vorran*, "the wall thereby was both strongest and highest by far; for scarce a furlong from hence upon a good high hill there remaineth as yet some of it to be seen fifteen feet high and nine feet thick, built on both sides with four-square ashlar stone." It is not unreasonable to suppose that the wall was also originally surmounted by a parapet at least four feet in height. From the concurrent testimony therefore of all these witnesses we may conclude that in its original dimensions it must have been about twenty feet high. Such an elevation would be in keeping with its breadth; somewhat more than twice as high as it was broad. In the portions now remaining it rarely exceeds five or six feet in height; though occasionally in hollows, or other favorable situations, as many as eleven courses of stone are found standing together to the height of nearly as many feet.

The breadth varies considerably; in some places it is six feet; in others nine and a half; so that the average would have been about eight feet, as Venerable Bede states. The frequency with which the breadth varies inclines Dr. Bruce to the belief that numerous gangs of laborers were simultaneously employed upon



the work, and that each superintending centurion was allowed his discretion as to its width. The northern face is continuous ; but the southern has numerous out-sets and insets, measuring from four to twelve inches ; probably at the points where the sections joined.

The same difference in superintending skill seems also to be sometimes indicated by the quality of the masonry. The stones are always of the shape that can be most easily quarried, and of a size which admits of easy transport ; never exceeding what a man could carry slung over his shoulders. When good material was available near at hand it was taken ; but an inferior quality of stone was never used to avoid the labor of bringing a better even from a distance, as great sometimes as seven or eight miles. The quarries that were worked for this purpose can generally be ascertained now, and in some places the quarrymen have left their names carved upon them. The most interesting example of these is carved on the face of a rock, which overhangs the picturesque little river Gelt, in Cumberland.

The wall was faced on both sides with carefully squared blocks from fifteen to twenty inches long, ten or eleven broad, and eight or nine thick ; and the interior was filled in with rubble-work of any sort firmly imbedded in mortar. Its strength has largely depended upon the character of the mortar employed. Limestone, which is abundant in most parts of its course, was ground up and carefully mixed, unslacked, with sand, gravel and chippings of stone. When about to be used, water was freely mixed with the mass, which would set in a few hours, and soon become as hard as rock. The facing-

stones were all roughly hewn into something of a wedge shape and after two or three courses had been set in a thick bed of mortar and carefully pointed, a mass of mortar was poured into the interior, and stones of every kind and shape of a convenient size were puddled in amongst it. Course upon course was added, all preserving their parallelism with great exactness, but making no attempt at breaking joints, and one mass of concrete was piled upon another continuously, until the whole became a solid, compact structure. It might have lasted perfect until now, if man's destroying hand in removing the facing-stones for building purposes, had not given the opportunity for roots of trees and shrubs, and the disintegrating tooth of the frost, to work their will upon it.

Throughout its whole length the stone wall was accompanied on its northern margin by a broad deep ditch, which added greatly to its strength. This can still be traced, with trifling interruptions from sea to sea, even in places where the wall itself has now entirely disappeared; as for example in the fertile districts, where it has been removed on account of tillage. Owing to the moisture that collects upon the site of the ditch the grain springs in it with unusual luxuriance, or it is frequently kept in grass, while all about it is cultivated. Where it traverses a flat country, the material removed from the ditch is often piled upon its northern margin, so as to cause an additional obstruction to an enemy. On the other hand, where it would be of no service whatsoever, as along the edge of a cliff, it is occasionally omitted. A vast amount of labor has been expended in its excavation, where it had to be carried through a rocky soil. In

some spots enormous blocks of stone, one of them estimated to weigh not less than thirteen tons, lie just as they have been lifted out of it. In other places Hodgson tells us that "the earth taken out of it lies spread abroad to the north in lines, just as the workmen wheeled it out and left it. The tracks of their barrows, with a slight mound on each side, remain unaltered in form" (p. 276). The nicety with which the ditch was sloped seems to have varied with different overseers. Sometimes it is as smooth as a modern railway cutting, again it exhibits evident marks of haste and carelessness. Its size in several places is still very considerable; in one it measures forty feet across the top, and fourteen across the bottom, and it is ten feet deep; in another, reckoning from the top of the mound on the northern side, it has a depth of twenty feet.

So much for the mode of construction of the stone wall, or murus, the first and most striking of the three parts, which constitute the system of defences. The second, as before stated, consisted of an earth wall, or vallum, running always south of the murus, and made up of three ramparts and a ditch. One of these ramparts is placed close upon the southern edge of the ditch; the other two, of larger dimensions, stand one to the north and the other to the south of the ditch, and at a distance of about twenty-four feet apart. Even at the



present time the mounds of the vallum sometimes rise six or seven feet above the level of the adjacent country.

They are composed of earth mingled not unfrequently with masses of stone, which occasionally preponderates to such an extent as to supply ready material for the construction of dikes. There is every reason for supposing from the accounts given by the ancient writers of the Roman method of constructing earth-works that these mounds were originally strengthened by the addition of a palisade of wooden stakes. The ditch was similar in character to that of the murus, only to judge from present appearances, its dimensions must have been somewhat less. Its usual depth is about seven feet below the natural level of the soil ; so that, as Dr. Bruce tells us, he has seen, while travelling along the highway in its vicinity, a ploughman and his team entirely disappear in descending into it. Like the ditch of the murus it has frequently been cut through beds of stone. Although the distance between the murus and the vallum frequently varies, the lines of the vallum maintain nearly the same relative position to each other throughout their entire course. These lines have become nearly obliterated, in those places where the plough has been wont for so many ages to draw its furrows across them ; but in the grass-lands they are still distinctly marked for miles together ; and where they have enjoyed the protection of being planted over with trees, they are still better preserved.

The *third* portion of the system of defences, and an equally important one, was made up of structures designed for the accommodation of the troops that manned the lines, and of roads over which they and their stores might be transported. These erections were of three kinds, permanent camps, or stations,

mile-castles, and turrets. The last two will require only a few words of explanation ; but the stations were of very great importance, and need to be described at greater length.

They were ranged along the line of the works, at an average distance apart of about four miles, and were adapted for the residence of the commanding officer of the district and to provide secure and comfortable quarters for a strong body of troops. Like all Roman camps, they are quadrangular in shape, and comprise an area of from three acres to nearly six in the case of the largest. They are usually placed upon ground sloping to the south, and abundantly supplied with water. A stone wall some five feet in thickness surrounded them, and they were provided with a gateway upon each side. In all but three instances the murus, when not coinciding with the northern wall of the station, comes up against the north side of the east and west gateways. In the same manner the vallum approaches close to the southern wall of the station, or comes up to the south side of the gates. Main streets intersect the stations, proceeding from the four gateways, and crossing each other at right angles ; and there were also minor streets, parallel to the others, but narrower. The abundant ruins outside the walls indicate that extensive suburbs were required for the accommodation of the camp-followers ; in many instances these seem to have developed into small towns. But it is evident that the stations were constructed with exclusive reference to defence ; and no indications of luxury, like the fine mosaic pavements so common in ruins of Roman villas, found in the south and west of Eng-



land, have ever been discovered in the region of the wall.

In ascertaining the number of these stations, and the designations under which they were known to the Romans, a document which has come down to our own times from those of the Roman occupation of Britain, has proved to be of the greatest service. It is styled, "*Notitia Dignitatum*," that is, a register of the several military and civil officers and magistrates, both of the eastern and of the western empires, with the names of the different places where they were stationed. Dr. Bruce calls this the army-list of the Roman Empire, but Guizot more properly compares it to a modern red-book, or court almanac, with the single difference that the red-book gives the names of the persons in office, while the *Notitia* mentions only the offices. It is believed to have been compiled about the end of the reign of Theodosius the First; in the opinion of the historian Gibbon, "between the final division of the empire (A. D. 395), and the successful invasion of Gaul by the Barbarians, (A. D. 407)." \* In that chapter of the *Notitia* which gives an account of the military establishment of Britain there is a list of the prefects and tribunes under the command of the Honorable, the Duke of Britain. That portion of the British section, with which we are at present concerned, bears the heading, "Also along the line of the wall," and contains a list of the stations connected with it, twenty-three in number.† However, as there is no

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\* Decline and Fall of the Roman Empire, chap. xvii

† "*Notitia Dignitatum*," Ed. Böcking, c. xxxviii; vol. ii. p. 113\*; "Item per lineam valli. Tribunus Cohortis Quartæ Lingonum Segeduno; Tribunus Cohortis Primæ Cornoviorum Ponte Æli; Præfectus Alæ Primæ Asturum Conderco;



statement that they are actually upon the rampart, or that they are recited in the order of their position, or whether the enumeration is from the east to the west or *vice versa*, the early English antiquaries had no clue by which to identify them, except the fallacious one of the similarity of the ancient names to modern ones, and all of their guesses have turned out to be wrong. But the first twelve stations mentioned in the *Notitia* have been accurately determined by means of inscriptions found in their ruins; for in the *Notitia* with each station the designation of the battalion attached to it is given. We are thus enabled to identify numerous localities with absolute certainty, to ascertain the order in which they were enumerated, and hence to determine with confidence other places in the series.

A very careful and costly survey has been made by Mr. McLaughlan for the Duke of Northumberland of the whole line of the wall; and from it an admirable map has been compiled, on which the position of the stations is laid down.

Segedunum, the *first* station named, we can have no doubt was Wallsend, at the eastern extremity, and not

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Tribunus Cohortis Primæ Trixagorum Vindobala; Præfectus Alæ Savinianæ Hunno; Præfectus Alæ Secundæ Asturum Cilurno; Tribunus Cohortis Primæ Batavorum Procolitia; Tribunus Cohortis Primæ Tungrorum Borcovo; Tribunus Cohortis Quartæ Gallorum Vindolana; Tribunus Cohortis Primæ Asturum Æsica; Tribunus Cohortis Secundæ Dalmatiorum Magnis; Tribunus Cohortis Primæ Æliæ Dacorum Amboglanna; Præfectus Alæ Petrianæ Petrianis; Præfectus Numeri Maurorum Aurelianorum Aballaba; Tribunus Cohortis Secundæ Lingonum Congavata; Tribunus Cohortis Primæ Hispanorum Axeloduno; Tribunus Cohortis Secundæ Thracum Gabrosenti; Tribunus Cohortis Primæ Æliæ Classicæ Tunnocelo; Tribunus Cohortis Primæ Morinorum Glannibanta; Tribunus Cohortis Tertie Nerviorum Alione; Cuneus Armaturarum Bremetenraco; Præfectus Alæ Primæ Herculeæ Olenaco; Tribunus Cohortis Sextæ Nerviorum Virosido."

Bowness, at the western, because here was found an altar, dedicated to Jupiter by the prefect of the fourth cohort of Lingones, which the Notitia tells us, was stationed at that place. Pons Ælii, the *second* station, must have been at Newcastle-upon-Tyne. Numerous coins of Ælius Hadrianus have been found there, and the easternmost of three Roman roads leading to Scotland, crossed the Tyne there by a bridge, the abutments of which have been seen in recent times.

Condercum, the *third* station, the Notitia tells us was guarded by the first troop of Asturians (from Spain), and a stone so inscribed was discovered at Benwell. Vindobala, the *fourth*, and Hunnum, the *fifth*, can only be identified by their position between Condercum, (Benwell) and Cilernum (or Chesters), the *sixth*. For at Chesters, on the north Tyne, several slabs have been found bearing the name of the second troop of the Asturians, which according to the Notitia was stationed at Cilernum. We have the same kind of evidence that Procolitia, the *seventh*, with its first cohort of Batavians, was at Carrawburg, and that Borcovicus, the *eighth*, the camp of the first cohort of Tungrians, was at Housesteads. All of these stations are upon the actual line of the wall; but Vindolana, where the fourth cohort of Gauls was placed, the *ninth* station of the Notitia, is shown by inscriptions found there to have been at Chesterholm, which lies more than a mile to the south of the rampart; Æsica, the *tenth*, is Great Chesters, where a cohort of the Asturians was stationed; and Magnæ, the *eleventh*, where was the second cohort of Dalmatians, is proved by the evidence of another altar to have been Carvoran. Amboglanna, the *twelfth*, as is

shown by an inscription recording the presence there of the first cohort of the Dacians, must have been at Birdoswald, where it was found.

In this way the ancient designations of the first twelve stations on the line from Segedunum (Wallsend) to Amboglanna (Birdoswald) have been accurately ascertained; but westward from that point no evidence from inscriptions has been discovered to identify another station. The fertile character of the country between the Irthing and the Solway has stood in the way of the preservation both of the wall itself and of any antiquities connected with it. Stone is scarce there, and the materials of the wall and the stations have been consumed in the construction of houses, fences and dykes. Besides, the superstitious inhabitants have looked upon all stones bearing inscriptions as unlucky, calling them "witch-stones," which hindered the butter from coming, and wrought other mischief. This could only be prevented by pounding them in pieces. Up to the present time, accordingly, the identification of the last eleven stations of the *Notitia* has continued to be a matter of much uncertainty, and antiquaries differ greatly in regard to them. Carlisle, which, all agree, represents the ancient *Luguvallum*, is not mentioned among the stations along the line of the wall. It is plainly identified, however, in one of the so-called *Itineraries*, or lists of roads, stations and distances, over the whole extent of the Roman Empire, three of which have come down to us from the fourth century. In the *Antonine Itinerary*, in which the names and distances from each other of the towns and stations along the principal military roads in Britain are put down, one

route is given as that from London to Luguwallum on the Wall.\* Probably the reason it was not put into the Notitia was that it was so strong a place that a fixed garrison was not required there. The names of all these numerous stations, which must have been household words in the days of the Roman occupation, have been almost completely obliterated from the local vocabulary. The reason is that the choice of their situation was dictated solely by military and not by commercial necessities. The only exceptions to be found, according to the opinion of Dr. Beddoes, are Magnæ (or Carvoran), which word seems to be a Celtic translation of the Latin "Great Town;" and Carlisle, (the Welsh *Caer-luel*), in which instance the Roman Luguwallum sounds like the Welsh word Latinized.† These places, many of which were for centuries the abodes of busy men, resounding with the hum of multitudes and the clash of arms, now present a scene of utter desolation. Their long occupation, however, has given to their sites a degree of fertility, which they will never lose; and their débris is even now regarded as the best possible fertilizer. Wherever the soil is turned up, fragments of Roman pottery, bones of animals, horns of deer, and other imperishable articles are universally to be found.

Of the different Roman Legions, which were at various times employed for the conquest of Britain, three were at one period or another stationed at the wall, and all of these have left upon it written memorials of themselves. They were the Second (called the Aug-

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\* A full account of the British Itineraries may be found in Dr. Guest's "*Origines Celticæ*," vol. ii., p. 101-118.

† *The Races of Britain*, p. 33.

ust), the Sixth (styled the Victorious, Pious and Faithful), and the Twentieth (whose appellative was Brave and Victorious).<sup>\*</sup> Accompanying them were bands of auxiliaries from the most distant quarters of the empire. Not less that eighteen different nationalities are represented among them. Gauls and Spaniards; Germans and Dacians; Thracians and Dalmatians, and even Moors, have all left their imperishable records. There is, however, scarcely a trace of Britons having been so employed; although we learn from the *Notitia* that a squadron of British horse was stationed in Egypt, a cohort of Britons in Armenia, Elder Britons in Illyricum, and Invincible Younger Britons in Spain. That these barbarian battalions continued to retain their distinct nationality seems to be indicated by the names that have been preserved of the deities they severally worshipped. There are Teutonic and Celtic divinities, such as Moguntis, Vitires, Balatucader, and Taraunus; or Eastern deities like Mithras and Astarte; as well as the more familiar representatives of the Roman Pantheon. But it is noticeable that troops belonging to the same nation were never placed in contiguous stations. Thus, for example, there were three corps of Asturians, (from Spain) stationed along the wall, but they were widely separated from each other by bands of Batavians,

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<sup>\*</sup> The other legions serving in Britain were the ix<sup>th</sup> which was probably exterminated during a revolt of the Brigantes, having its place afterwards taken by the v<sup>th</sup> (Mommsen, "*Provinces of the Roman Empire*," vol. i., p. 204; Hubner, "*Inscrip. Brit. Lat.*," No. 241,) and the xiv<sup>th</sup>, which was finally withdrawn from Britain (A. D. 70), by Vespasian, (Horsley, "*Britannia Romana*," B. i., Chap. vi., p. 82). Portions also of the vii<sup>th</sup>, viii<sup>th</sup>, and xxi<sup>nd</sup> were brought over by Hadrian; of the vii<sup>th</sup> no traces have been ever discovered in Britain; of the viii<sup>th</sup> a bronze boss of a shield is in possession of Canon Greenwell; and of the xxi<sup>nd</sup> a dubious relic is preserved at Abbotsford (Hubner, p. 100 and Nos. 495 and 846).



Germans and Gauls. In this way mutiny was rendered impracticable.

As regards the number of men required to garrison the wall only an approximate estimate can be made. Of the twenty-three stations fifteen were garrisoned by a cohort, which varied in its composition from six hundred to a thousand. A troop of cavalry, or *ala*, numbered three hundred; and as there were five *alæ*, with three other differently designated bodies of men, which are believed to have been of equal size with the *ala*, it may fairly be reckoned that the average strength of the garrison was from ten to fifteen thousand. Besides these the Sixth Legion, numbering six thousand men, had its headquarters at York (*Eburacum*), not much farther off than the length of the wall, with which it was connected by three excellent military roads.

I have already stated that in addition to the stations, mile-castles, so-called from their average distance apart, were placed, to protect the troops who guarded the contiguous stretch of the wall against sudden surprise. These were quadrangular buildings, usually measuring about sixty feet in each direction, and built against the southern face of the *mur*us.

That they were constructed at the same time is evident from the resemblance of their masonry. Although they were usually at the same distance from each other, yet whenever the *mur*us had to cross a river, or a mountain pass, we find a mile-castle placed conformably to guard the passage. They are provided with gateways, both on their northern and their southern sides, at least ten feet wide. As in all the stations and mile-castles, reckoned together, there must have been at least one



hundred gateways opening to the north, it is plain that the wall was not intended as a mere fence, but rather as a line of military operations, designed to overawe a foe whose assaults were chiefly to be expected from that quarter.

Turrets, or watch-towers, were the last of the different structures built along the line of the wall, to which I have alluded. Four were placed between each two mile-castles, and they were little more than strong stone sentry-boxes, about four yards square on the inside. They must have been quite within hailing distance of each other, but tradition has further reported that speaking-tubes were laid along the whole line of the wall for the purpose of rapidly conveying information. Thus the poet Drayton makes the wall declare :

“ Townes stood upon my length, where garrisons were laid  
 Their limits to defend ; and for my greater aid,  
 With turrets I was built, where sentinels were placed  
 To watch upon the Pict ; so me my makers graced  
 With hollow pipes of brasse ; along me still they went,  
 By which they in one fort still to another sent,  
 By speaking in the same, to tell them what to do,  
 And so from sea to sea could I be whispered through.”\*

This singular tradition, doubtless, owes its rise to the lead pipes occasionally to be met with in the ruins of the stations, or to the earthen pipes, which are quite common there ; both of which were used for the purpose of conveying a supply of water. Hubner, however, quotes a singular statement, apparently corroborative of some such employment of speaking-tubes, from the historian, Dion Cassius (B. lxxiv., ch. 14), in which he tells about a similar provision of brazen pipes, used for the

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\* “ Poly-olbion,” by Michael Drayton : *The twenty-ninth Song*.

purpose of connecting the towers along the line of the wall of Byzantium.\*

So much for the various structures of the great wall. But these arrangements were not enough; the barrier was also provided with its military roads, without which all the rest would have been useless. It might almost be said that the chief purpose of the murus and the vallum was to protect, and to conceal from view, as well upon the south as the north sides, the bodies of men that marched over the military road. This road is usually about seventeen feet wide (a breadth greater than that of the famous Appian Way a few miles outside of Rome), and it is substantially built after the well-known Roman fashion. In most places, where it still remains, it is now completely grass-grown, but it can easily be distinguished from the adjacent ground by the fineness of the herbage upon it. It runs from mile-castle to mile-castle, not always keeping close to the murus, but taking the easiest path between the required points. In the craggy portions of the central part of the island, where the murus shoots over the highest and steepest summits, the road winds a tortuous course, engineered from point to point by the easiest gradients, but still often with a very great degree of steepness. To avoid this rocky region, therefore, and thus to facilitate communication, an additional road was constructed, quite a distance south both of the murus and the vallum, following more nearly the course of the valley of the South Tyne. Much of this still remains, and is called at the present time The Stanegate. It ran from Cilernum (Chesters), to Magnæ (Carvoran), and even farther; that is, from a point above

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\* *Corpus Inscript. Lat.* Vol. vii., p. 104.

the junction of the North Tyne with the South Tyne, to the Irthing, one of the head waters of the Eden. Moreover, the wall was crossed by two great lines of communication, the Watling Street, and the Maiden Way, each having various subsidiary roads branching from it, by which, as I have already said, reinforcements could easily be forwarded from the great city of Eburacum (York).

These elaborate details in regard to the characteristics of the great Roman Wall in Britain, confirm what a recent visitor to it has well remarked, that it "required for its construction as least as much skill and labor as a modern railway through a wild and distant region. . . . The amount of transportation of materials with the small facilities at command, made the labor relatively, if not actually, greater; and the work of maintenance was of course much greater." \*

The question now recurs who was the actual constructor of this elaborate and scientifically contrived system of fortifications. It has been assigned to different ages and to many individuals; but there are three principal hypotheses that have been maintained in regard to it. The old English chronicler, Gildas, writing about A. D. 560, and Nennius, in the eighth century, say that it was not built until towards the middle of the fifth century, after the Romans had abandoned possession of the island; and that it was constructed at that time by a legion sent back for this purpose for a brief period in answer to the importunate cries of the miserable inhabitants. This statement not only seems in itself highly improbable, under the prevailing conditions of the Roman empire at that

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\* "The Imperial Island," by James F. Hunnewell, p. 41.

dâte, but it lacks confirmation either from inscriptions or from coins. Nevertheless it was copied by Bede and the mediæval writers, and it has even colored the opinions of the older school of English antiquaries. The late lamented John Richard Green, however, repudiates it utterly. He first quotes the statement of a Byzantine historian that "in A. D. 410 a letter of the Emperor Honorius bade Britain provide for its own government and its own defence ;" \* then he adds : " Few statements are more false than those which picture the British provincials as cowards, or their struggle against the barbarian as a weak and unworthy one. Nowhere, in fact, through the whole circuit of the Roman world was so long and so desperate a resistance offered to the assailants of the empire. Unaided as she was left Britain held bravely out, as soon as the first panic was over, and for some thirty years after the withdrawal of the legions the free province maintained an equal struggle against her foes." †

The opinions of Gildas, however, have found a modern supporter in Dean Merivale, although he employs a considerable latitude in his interpretation of them. To quote his exact language : " Hadrian connected the camps of Agricola with a fosse and palisaded rampart of earth. . . . Severus, two generations later, may be supposed to have thrown up the second line of earthworks which runs parallel to those of Hadrian, and is evidently formed to support them ; and finally the stupendous wall of solid masonry . . . . running as an exterior bulwark a few yards to the northward from end to

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\* Zosimus, Lib. vi. (trans. of Löwenklau, Basel, 1576), p. 114.

† The Making of England. *Introduction.*

end, may be ascribed most probably neither to Hadrian, nor Severus, but to the age of Theodosius and Stilicho.”\*

A very different theory from this was elaborated by the great antiquary Horsley, to whom I have already referred, and it has been accepted by many standard historians, such as Gibbon, and his editor, Dean Milman, and very recently by Dr. Guest.† Horsley thought that most of the stations along the wall were built by Agricola, and that the northern mound of the vallum was his military way. The southern mounds of the vallum, with its ditch, he ascribed to Hadrian, whom he represents as taking for his military way the one which Agricola had constructed. The stone wall with its fosse and all its works, he ascribed to Severus. And there is even a variation upon this hypothesis suggested by Mr. Robson, the writer of the article, “Vallum Romanum,” in Smith’s “Dictionary of Greek and Roman Geography.” He considers the stone wall to be the work of Hadrian, and the earthen rampart to have been built by Severus. But there is one fatal defect in Horsley’s theory: it requires that Hadrian in constructing his wall should have rested satisfied with a military way that lay completely open to the enemy upon the exposed side of the north.

The theory, however, which is most widely known, and has been most generally accepted by modern antiquaries and by recent historians, such as Mommsen and Hubner, Green, Elton,‡ and Scarth,§ is what

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\* History of the Romans under the Empire, Chap. lxvi. (Am. ed., vol. vii., p. 348).

† Origines Celticæ, vol. ii., p. 90.

‡ Origins of English History, pp. 324–328.

§ Roman Britain, pp. 73–82.



is called the “Ælian hypothesis.” This regards the murus and vallum as forming one system of fortification, as I have endeavored to show, and attributes their construction to the Emperor Publius Ælius Hadrianus, about A. D. 120.

This view was first propounded by Hodgson, the historian of Northumberland, a life-long and devoted student of the question, in opposition to the opinion of Stukeley, who thought all the works were constructed by Severus. But it has found its most persistent and strenuous advocate in another scholar who has devoted even more time to the question than Hodgson. I refer of course to Rev. Dr. John Collingwood Bruce, to whose sumptuous volume entitled “The Roman Wall” I have already acknowledged my indebtedness. He has been sustained by the antiquaries of Northumberland, despite the clamors of those of Cumberland, who have generally maintained the Severus theory.

It now only remains for me to consider in a few words the several arguments in favor of the Ælian and against the Severus hypothesis, so far as they rest upon the very scanty notices to be found bearing upon the question in the Latin and Greek writers.

The earliest authorities who make any mention of a wall in Britain are Dion Cassius,\* and Herodianus.† Both wrote in the Greek language; both were contemporaries of Severus, and both give an account of his expedition into that country (A. D. 208); for which, in fact, Dion Cassius is the principal authority. If, therefore, Severus built the wall, we should certainly

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\* Dion Cassius, lxxii., 8; lxxvi., 12.

† Herodianus, iii., 14.



expect them to have spoken of it. As they do not, the inference is that it was a well-known object, when Severus landed in Britain. The next writer who has anything to say upon the subject is Spartianus, who composed lives of several of the emperors, about the end of the third, or the beginning of the fourth century, long after the events he described. In the life of Hadrian he merely says "he went to Britain . . . and there first drew a wall (murum) eighty miles in length, in order to divide the barbarians from the Romans."\* In his life of Severus he relates that "he secured Britain, which is the chief glory of his reign, by a wall (muro) drawn across the island to the boundary of the ocean on either side."† It is upon this passage that the advocates of the Severus theory mainly rest their case; but the advocates of the Ælian hypothesis explain it in two ways. Some believe that Spartianus refers to the wall in Scotland, of which I have already spoken, built some sixty or seventy years before Hadrian's time by Lollius Urbicus, legate of Antoninus Pius; others think that Spartianus, writing so many years after the event, owing to lapse of time and distance from the locality, was misinformed and reports Severus as having built a wall, whereas in fact he only made repairs upon one already in existence, built by Hadrian. Subsequent writers, it is true, who lived long afterwards, ascribe the wall to Severus; but the silence of his contemporaries seems to be much more significant.‡

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\* Spartianus, "Vit. Hadriani," 11.

† Idem, "Vit. Severi," 18; cf. 22.

‡ Eusebius, ap. Hieron. Chron. (Migne. Patrol. Lat. tom. xxxiii. p. 638); Aurelius Victor, "De Cæsaribus," xx; Idem, "Epitome," xx; Eutropius, viii., 19; Orosius, vii., 17; Cassiodorus, p. 640 (Ed. Mommsen).

Gildas and Nennius derived their ideas from these late writers in regard to the condition of Britain at the time of the withdrawal of the Romans; but it must be borne in mind that Nennius in giving the native traditions puts the wall, which he says was built by Severus, between the Forth and the Clyde and not in England. Tradition seems to have handed down not only the name of Severus but the recollection of his severe discipline, his decision of character, his "incredible labors in cutting down woods, levelling hills, making marshes passable and constructing bridges," which Dion Cassius relates, as well as of his immense losses of men, "not less than fifty thousand perishing." Tradition would even have it that three hills near York, where he died, which are actually remains of an ancient glacial moraine, were mounds raised by his troops to celebrate his funeral rites; and to this day they go by the name of Severus' Hills. Such an immortality of fame seems almost like the lurid glow illuminating the memory of Nero in the minds of the peasantry of the Roman Campagna, and it has found an echo in the verses of Spenser, in his celebrated description of the English rivers:

"Next these came Tyne, along whose stony banks  
The Roman monarch built a brazen wall,  
Which mote the feeble Britons strongly flank  
Against the Picts, that swarmed over all;  
Which yet thereof Gaulsever they do call."\*

But as Severus was only in Britain three years altogether, the question may fairly be asked what opportunity could he have had for constructing such an enormous work. Surely he would have had no reason for

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\* *The Fairy Queen*, Book iv., Canto xi., st. 36.

doing this before his expedition into Scotland, in which he purposed to completely crush the northern barbarians; and there was not time enough for it between his return and his death.

But on the other hand, when we turn to the wall itself and the autograph statements its builders have left upon it, we read a very different story from what tradition has told. If Severus was the builder, we should expect to find frequent intimations of the fact in the stations and mile-castles, its most conspicuous elements. But the truth is that from Wallsend to Bowness we do not find, in the stations upon the line of the murus, a single inscription which belongs to his reign; while at Procolitia, Vindolana, Æsica, Magnæ, and at the station near Walton House, we meet with them commemorating Hadrian. So, too, the mile-castles, which are essential parts of the murus, but have no immediate connection with the vallum, bear similar testimony. Not one of them has yielded an inscription to Severus; while, on the other hand, five have supplied dedications to Hadrian. What is most significant is the circumstance that four of these mile-castles stand upon a part of line farthest removed from the vallum, and lying at a much higher elevation. This negatives the supposition that they could have been brought from the vallum; upon the theory that it only was the work of Hadrian. It is true that in three of the supporting stations, which are removed by a considerable distance from the line of the wall, memorials of Severus have been found, as well as in two ancient quarries. But when we make a comparison with the number of inscriptions that have been found in connection with the wall in Scotland, bearing the name of its builder, Antoninus

Pius, the fewness of those found near the lower isthmus, containing the name of Severus, would seem to preclude the possibility of his being its constructor. It is highly probable that Severus, before setting out upon his expedition into Scotland, would put the stations upon his line of march in good condition, and would make needed repairs along the line of the wall; and for this purpose he would naturally resort to the same quarries which had been worked by Hadrian. But in the very act of quarrying his workmen would necessarily remove the traces of their predecessors; so that quarry-marks in general seem to be of but little avail in determining the question of who was the builder. One discovery, however, made in an ancient quarry, does throw a great deal of light upon the question, and points conclusively to Hadrian. I refer to what is known as the *Thorngraston Find* of ancient coins. During the construction of the railway from Newcastle to Carlisle, in 1837, there was discovered near the station of Borcovicus (Housesteads), about half a mile south of the line, in an old quarry, buried amongst the chips of stone, a peculiarly shaped bronze vessel, somewhat like a skiff in form. This contained three imperial gold coins, wrapped up in a piece of leather, together with sixty silver denarii. The quarry had not been touched since the time the purse was deposited in it. Now as the coins bearing the latest date, all of which are unworn by circulation, belong to the reign of Hadrian, the conclusion seems to be irresistible that the Romans ceased to resort to the quarry during his reign.

In justice to the memory of the great Horsley, it ought to be borne in mind that all of this great amount of evidence from inscriptions has been discovered sub-

sequently to his time. He knew of only a single doubtful inscription bearing the name of Hadrian. Finally, we must remember that the erecting of such a monumental structure as is the wall is entirely in accord with the character of Hadrian. He was a great builder, as numerous works, in different parts of the empire, among them the well-known Castle of St. Angelo, at Rome, bear witness to this day. We may therefore conclude, I think, that the great Roman Wall in Britain may safely be called THE WALL OF HADRIAN.

For almost one-third of its entire length, from Wallsend to the North Tyne, there are only scanty remains left of it to be seen now. If the traveller chooses to take a long drive out of Newcastle, sixteen miles due west, over General Wade's excellent road, which I have already referred to, he will come to the spot where the old Roman road, The Watling Street, or, as it is less euphoniously denominated in the neighborhood, The Devil's Causeway, crosses the line of the wall. Before reaching it, however, as he approaches Halton, in the neighborhood of Hannum, the *fifth* station on the line, of the Notitia, he will see at Down Hill one of the most striking examples of the vallum anywhere remaining. Close to this station, in the year 1850, a stone was found bearing the inscription, *Fulgur Divom*, "the lightning of the Gods." It was the ancient belief that those who were struck dead by lightning had suffered under the special visitation of the gods, and they were buried upon the spot where they fell. Several examples of this same inscription have been found in different parts of Europe where they are preserved in the museums at Florence, Nimes, Palermo, and elsewhere. The one to which I



am now referring may be seen in the museum at Newcastle.\*

By far the most important portion, however, that still remains of these remarkable works is that extending for a distance of twenty-one miles, from Chesters (Cilernum), on the North Tyne, to Birdoswald (Amboglanna), on the Irthing, a branch of the Eden; and to this I shall confine my description of what can now be seen of them.

If only a single day can be devoted to exploration, it will be well for the traveller to take an early train from Newcastle by the Northern Counties Railway, for the station at Chollerford, twenty-four miles distant. Upon leaving the station he will find on the bank of the river, about a quarter of a mile below, one of the most remarkable remains of the wall which time and violence have spared. I refer to the abutments and piers of the Roman bridge, which once carried the military way across the North Tyne to Cilernum, the *sixth* station. The murus, still standing eight feet high, reaches the brink of the river and there terminates in a square building, in front of which is the eastern abutment of the bridge. After this had lain buried for ages under beds of sand and gravel, through a change in the course of the river to the westward in 1860, the bank was left in such a situation that the remains could be excavated and thoroughly explored by Mr. Clayton.

On the opposite side of the river stands the fine park and mansion of Chesters, Mr. Clayton's residence, where what remains of Cilernum can be seen. This gentleman is the owner of three of the principal stations, Cilernum, Borcovicus, and Vindolana, and of a large extent of the

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\* "The Celt, the Roman, and the Saxon," by Thomas Wright, p. 389.



wall itself. He has taken unwearied pains, and expended large sums of money in the exploration and preservation of its antiquities. These are worthily displayed in the noble portico added to the house for that purpose, not long ago. The traveller must not linger too long, however, over the relics of Cilernum, and over the ancient Roman cemetery, with its sepulchral slabs, near the river's side, but had better take horses at once and drive due west ten miles along the line of the wall to Housesteads Farm, the site of Borcovicus. For some miles his course will be over General Wade's road in long straight reaches up hill and down, the stones of the murus distinctly visible in its surface. After passing Walwick and ascending the long hill on which stands the old Taye Tower, all the lines of the barrier come grandly into view, running in apparent parallelism with each other. Here the road takes to the north bank of the vallum, and a great stretch of the wall appears on the right ; and before long the hill called the Limestone Bank is reached. This is some eight hundred feet above the level of the sea, and, commands a distant view of the Cheviot Hills. Here for the first time he will meet with distinct traces of the ancient military way, although it is not that, but the ditches, both of the murus and the vallum, which form the most remarkable features of this spot. Where they cross the crown of the hill, they have been excavated in the basaltic formation with enormous labor. The huge blocks lie about just as they were left by the workmen, and it is not easy to conceive how such enormous masses could have been extracted without the help of gunpowder. Hence onward the road stretches westward in a long dip over

Tepper Moor, with the vallum running by its side, and presenting here one of its most striking displays still to be seen. Soon the traveller arrives at the low and grass-grown relics of Procolitia (Carrawburg), the *seventh* station, about three and a half miles distant from Ciler-num. This station comprised an area as large as three and a half acres, but, as the greater part of it is still unexplored, little else appears than the gateways, which are readily discerned. The murus forms its northern wall, and the vallum comes up on each side to the defense of the east and west gateways. Leaving Carrawburg, he soon reaches Carraw, once a rural retreat for the monks of Hexham, which lies some seven or eight miles away to the south-east. Here the traveller leaves the cultivated land for the wild moorland, stretching away to the north in great green waves. The murus directs its course to the precipitous ridge of the highest of these, while the vallum seeks the bottom of the long and broken hill, half way up which stands a stone-built farmhouse, called Sewingshields, or "the cottage by the fosse."

Just north of the wall here once stood the noted mediæval strong-hold built for protection against the moss-troopers, called Sewingshields Castle. This is the place referred to by Scott, in the sixth canto of "Harold, the Dauntless," under the name of "The Castle of the Seven Shields;" but as the poet sings, now :

"no towers are seen  
On the wild heath, but those that Fancy builds ;  
And save a fosse that tracks the moor with green  
Is naught remains to tell of what may there have been."

But though its last material relics were removed

several years ago by the proprietor, tradition has much to tell about the marvels of this spot. King Arthur and Queen Guinevere, with all their court, here sleep enchanted in a chamber underground, never to come forth until their deliverer shall blow the bugle horn, placed on a table at the entrance, and then, with "the sword of stone" lying by its side, shall cut the garter also lying there. No one had ever heard where was the entrance to this enchanted hall, when one day a shepherd sitting knitting among the ruins, happened to drop his ball, which rolled down a deep, subterranean passage. Following up the clue, he penetrated to the chamber, and by the light of a fire that streamed up from a crevice in the floor, he beheld the king and queen, and all the company of sleepers. Grasping the sword, he drew it from its scabbard; the eyes of all the company opened and they rose upright. Then the shepherd cut the garter, but forgot to blow the horn; whereupon the spell resumed its power, and the king sank back to sleep, exclaiming :

" O woe betide that evil day  
On which this luckless wight was born,  
Who drew the sword, the garter cut,  
But never blew the bugle horn."

As was natural, terror brought loss of memory, and the unfortunate shepherd never afterwards was able to find the entrance to the enchanted chamber.

As the traveller proceeds on his westward course, he descends into a broad, basin-like recess in the ridge, called Busy Gap, a pass chiefly frequented by the moss-troopers and marauders of the olden time. A Busy Gap rogue was a term of reproach as late as the close of the

seventeenth century. When Camden and Cotton visited the wall, they did not dare to venture into this neighborhood "for the rank robbers thereabouts." The only peril to which the pedestrian is now exposed in this secluded region is of encountering some savage bullock, as he crosses the wide fields.

At the top of the slope, about a third of a mile from the road, stands Borcovicus, the *eighth* station, about five miles distant from the last. Here at the lonely farmhouse, called Housesteads, it will be well for the traveller to dismiss his carriage, and for the remainder of his pilgrimage to trust to his own resources. It is a fine walk, of some eight miles, over the hills, and for quite a distance along the wall itself to Caw Gap, and thence across the fields to Haltwhistle station, where the train may be taken back to Newcastle.

Far around lies a vast and striking solitude, above which rise the gray and lichen-clad walls of one of the largest stations, five acres in extent, and certainly the most interesting one still remaining. The English antiquaries find words fail them in attempting to describe its wonders. Stukeley, in 1725, called it "the Tadmor of Britain"; and Dr. Bruce claims that parts of it "present a spectacle, which even those who have visited the Italian Pompeii will not despise." All the gateways are excellently preserved, but the western is the most complete. In every sense this gateway has been a double one; two walls have to be passed before the camp is entered; each was provided with two portals; and each of the outside portals was supplied with two-leaved gates. In the middle was a strong gate-post, against which the leaves closed; and on each side was a guard-

chamber for the sentries. The northern one is still standing, fourteen courses high, and only requiring a roof to make it habitable. It was heated by a flue running round the sides under the floor. The projecting stones of both jambs are worn in such a fashion as to suggest that they were used by the idle soldiers to whet their swords upon. To give some conception of the labor and cost of the excavations made here by Mr. Clayton, we are told that, when he began, not a stone of this gateway was to be seen, and the surface was covered with a turf of unusual luxuriance. The same was the case with all the rest of the station. The opposite gateway, on the east, was discovered to have been anciently walled up, and on the floor was found a cart-load of mineral coal. There is no doubt that the Romans made use of such coal, when beds of it occurred in the vicinity. An ancient colliery worked by them in the neighborhood of Benwell (Condercum), the *third* station, has been explored by Dr. Bruce. The seam of coal there was two feet thick, and shafts had been sunk to the depth of between twelve or fifteen feet. So, too, at Habitancum (Risingham), the first station north of the wall, on the Watling Street, there was discovered a bath with a furnace and more than a cart-load of coal.

The southern gateway is of an unusually massive character, and shows traces of having been appropriated by some moss-trooper for his home. The shed in which he secured his cattle at night; the kiln in which he dried his half-ripened grain; and some of the steps by which he climbed to his little fortress over the cattle-shed may still be made out.

One of the most interesting features to be noticed at



the gateways is the pivot-holes, where the double gates swung, and the grooves worn into the thresholds by the wheels of the passing chariots.

Two principal streets ran from north to south through the interior, now one mass of desolation, and these were intersected by one running transversely from east to west. In the northern section of the middle division are remains of large buildings; one is 78 feet by 18; another, to the south, is even larger, 147 feet by 30. From certain differences in the character of the masonry this is believed by Dr. Bruce to date from the time of Severus. In two spots the station walls have been made wider by building an interior wall and filling up the intervening space with stones bedded in clay, so as to make a solid platform of masonry twenty feet wide. Undoubtedly these were intended for platforms, on which to plant a ballista, or engine for throwing heavy missiles (the artillery of Roman times), as several stones, weighing a hundred pounds or more, and roughly cut into a round or conical shape, were found lying near it. Two inscriptions, recording the construction of similar ballisteria, together with several stones of the same shape, have been discovered in the course of excavations made by the Duke of Northumberland at High Rochester (Bremenium), the second station north of the wall on the Watling Street. Josephus, in his account of the siege of Jerusalem, has given some remarkable instances of the destructive force of the ballista, which threw stones to the distance of a quarter of a mile.\*

Outside the station walls, both on the south and the

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\* Wars of the Jews, Book iii., chap. vii., 23.



east, are remains of numerous buildings attached to it. In 1856 there was discovered on the east side a carefully guarded passage through the wall, giving access to a little amphitheatre, constructed on the north side. It is about a hundred feet in diameter and ten feet deep and was intended for the sports of the garrison.

The numerous altars, bas-reliefs, statues and inscriptions that once excited the admiration of visitors, lying about exposed to constant depredation and the wear of the elements, have all been removed for safety either to Mr. Clayton's museum at Chesters, or to that at Newcastle, or the one at Alnwick Castle.

From Borcovicus, westward, a long reach of wall extends to Rapishaw Gap. On the way the traveller will pass one of the finest of the mile-castles along the whole line, with its wall still standing in fourteen courses, to the height of nine feet and a half. Here is, perhaps, the most picturesque scenery to be found in the whole walk. The cliffs rise with long and moderate slopes to the south, but dropping abruptly away to the north, so as to present a formidable barrier in that direction. The murus is to be seen in its full perfection and grandeur, running from hill to hill and cresting the crags. On the right lie the dark blue loughs of Northumberland, sleeping in the hollows of the moorland; on the left is a magnificent view over the valley of the Tyne to Skiddaw and the hills of Cumberland. For a long distance the path has lain along the top of the broken and dismantled wall. After dropping into the gap, it ascends and crossing a long ridge, commanding an extensive view, it comes to a neat little farmhouse, called the Hot Bank, the home of the ancient family of the

Armstrongs, situated in a hollow called the Milking Gap.

One mile due south of Milking Gap, lies Chesterholm, the Vindolana of the Notitia, and the *ninth* in the line. Here for the first time we meet with a station lying south of both lines of the barrier ; others, so situated, occur to the westward, but in no instance so far removed from it as this. The vallum here is at its maximum distance from the murus, sweeping away from it in two curves, south of the vallum. Vindolana stands upon the direct line of the Stanegate, the military way leading from Chesters (Cilernum) to Carvoran (Magnæ), and as it commands the important defile which gives access to the valley of the South Tyne, it may well have been a fortress, previously planted here by Agricola. This station has been for time immemorial the common quarry of the farm here, and of all the neighborhood, so that but little remains of it, although many altars and inscriptions have been found in it. But the most interesting relic connected with it is the Roman mile-stone, standing near the northeastern angle of the station, on the very spot where Roman hands planted it at least seventeen centuries ago. The pillar is six feet high, and one foot ten inches in diameter. Traces of an inscription are visible on its western face, but only a letter or two can be made out. It is the only Roman mile-stone in England, still occupying the position where it was originally placed.

Rejoining the wall at Milking Gap, and continuing his course westward, the traveller soon reaches another striking gap, where on mounting the hill he finds the rubble-built core of the wall very conspicuous, as it shoots

due north in order to seize the extreme edge of the cliff. Descending again he comes to still another gap, in which is a very fine specimen of a mile-castle, which was excavated by Mr. Clayton in 1854, and gives the name of Castle-Nick to the locality.\*

The walls of this mile-castle are in an excellent state of preservation, seven feet thick, and about five feet high. Its interior dimensions are sixty-two feet from north to south, by fifty from east to west; and the foundations of the structures originally standing inside of it are still visible. The military way, in its immediate neighborhood, is very clearly to be traced, twenty feet in width, and having both kerb-stones still in place.

Continuing on his way, the traveller soon reaches a minor depression in the steep and broken crags, called The Cat's Stairs, down which it will be best for him to scramble, and walk along the plain to the next opening, which goes by the name of Peel Crag Gap. As the defile here is wider than usual, with long and gentle slopes on each side, special precautions have been taken to guard it. On both sides of the pass the walls bend sharply to the south with the result of narrowing the gorge and exposing an enemy to a flanking fire, within half bow-shot on either hand. The great ridge of basalt here disappears for a space, and sandstone takes its place, up which on a long and moderate slope the wall stretches, till it reaches the summit, called Winshields Crag, one thousand feet above the sea level. In all directions is a most extensive view. On a clear day ships sailing on the Solway can easily be descried, and the hills of Dumfriesshire, sixty miles away due west, are in plain sight. To

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\* It is shown in the frontispiece, from "Bruce's Roman Wall," p. 226.

the south of west is seen the mountain group of the Lake District, with Skiddaw for its prominent feature. No towns or villages are in sight, and only a few scattered houses, not one of them near at hand. In the midst of this solitude and silence the great wall stretches far away to the west.

By a gentle descent the traveller comes to a gap of bold proportions upon which popular superstition has bestowed the ill-boding appellation of The Bogle Hole. This may perhaps be the very spot to which an eminent Byzantine historian of the sixth century refers : " In this isle of Britain men of ancient time built a long wall, cutting off a great portion of it ; for the soil and the men, and all other things are not alike on both sides. On the southern side there is wholesomeness of air in conformity with the seasons ; moderately warm in summer and cool in winter. Many men inhabit there, living much as other men. The trees with their appropriate fruits flourish in season ; the corn-fields are as productive as others, and the district appears to be sufficiently fertilized by streams. But on the northern side all is different, in so much indeed, that it would be impossible for a man to live there even half an hour. Vipers and serpents innumerable, with all kinds of wild beasts, infest that place ; and what is most strange the natives affirm that if any one passing the wall should proceed to the other side, he would die immediately, unable to endure the unwholesomeness of the atmosphere. They say also that the souls of men departed are always conducted to this place."\*

The veracious historian goes on to tell a long story about the methods of this infernal transportation, which

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\* Procopius, *Bell. Goth.* iv. 20.

I will not quote, as I only wish to give a glimpse at the wholesome terrors the Scotch Highlanders had inspired in the sixth century in the purlieus of the imperial palace at Constantinople.

Leaving this spot, with its name of evil omen, the traveller soon comes to the defile, called Caw Gap, through which runs a modern highway leading northwards into Scotland. After passing this he comes to another mile-castle, which has also been excavated by Mr. Clayton, and found to closely resemble the one at Castle-nick. This goes by the name of Cawfields. Here the land becomes lower and more fertile, and as a consequence cultivation has brought with it the destruction of the stone work of the wall. But before the traveller has quite reached the spot here indicated, if he intends to take the train at Haltwhistle, he must leave the line of the wall and descend the long grassy slopes to the highway. On his way he will pass certain relics of the Age of Stone, two menhirs, locally called "The Mare and Foal," huge, rough, upright stones, similar to those found in many countries of western Europe.

This is as much of wall-exploration as a "well-girt" traveller can possibly accomplish in one day, that is to say from Chesters to Cawfields. The stretch of the wall westward as far as Birdoswald (Amboglanna) is equally well worth visiting, but to accomplish this most conveniently the traveller had better make his point of departure from the western side of the island instead of from Newcastle. He will find Gilsland Spa, a pretty little watering place in the picturesque valley of the Irthing, with its excellent hotel, "The Shaws," a most desirable headquarters for his excursions. Gilsland Spa was vis-



ited by Walter Scott in his youth more than once ; some of the scenes of Rob Roy are laid here ; and here he met his future wife, Miss Charpentier, after having undergone a previous flirtation, recalled by certain "Lines to a Lady, with flowers from the Roman Wall," scarcely good enough to bear quotation. The easiest way of reaching Gilsland Spa is by omnibus meeting the train at the Rosehill railway station, and from it excursions can readily be arranged.

The first one will be to the station of *Æsica* (Great Chesters), the *tenth* along the line of the wall, nearly six miles west of Housesteads. It stands in the open fields a little beyond Caw Gap, where the traveller has left the wall at the end of his previous exploration. Notwithstanding its name, it was one of the smallest stations, not exceeding three acres in extent. Of the *mur* once described as to be seen here, some twelve or thirteen feet in height, nothing now is left ; but the earth ramparts and ditch are clearly defined. The interesting feature, however, of this station is the aqueduct, by which it obtained its supply of water. The water course consists of a channel three or four feet deep, and proportionately wide, cut in the sides of numerous little hills on the north. To preserve the water level a most circuitous course was taken ; but so effectually has this been done, that we are told by Dr. Bruce it was only necessary to resort to a bridge, or embankment, once. This bridge does not now exist, but its site is indicated by the name Benk's Bridge. The whole length of the aqueduct is six miles, while the distance in a straight line is little more than two miles and a quarter ; and by it the water of Caw Burn is brought close to the station.



Hard by the vallum at the southwest are some prehistoric barrows ; and still further south, near the Stanegate, is a group of Tumuli, which goes by the name of The Four Laws. Near Great Chesters the depression in the land comes to an end, and the crags of basalt again rise high with the murus ascending them. A very fine piece is to be seen here at a place called Cockmount Hill. To the westward of this small traces of the wall are visible until Walltown is passed, when the traveller comes to the towering serrated rocks, known as "The Nine Nicks of Thirlwall," the highest of which, Mucklebank Crag, is eight hundred and sixty feet above the level of the sea.

The wall here climbs and descends the little hills, clinging with its accustomed pertinacity to the rugged edges of the line of basalt. Several interesting sights are to be seen at Walltown. Near the wall is a spring, surrounded by masonry, called by the present inhabitants King Arthur's Well. An ancient tradition tells that here Paulinus baptized Ædwin, King of Northumbria. From the fact of its having been inclosed in so open and wild a country it must have been regarded as a place of historical importance and interest. Chives grow abundantly here in the crevices of the rocks, and the universal opinion would have it that they are a donation from the Romans, although I have read that they are indigenous in other parts of England. However this may be, Camden tells us, in the quaint version of old Philemon Holland : "There continueth a settled persuasion among a great part of the people thereabouts and the same received by tradition, that the Roman soldiers of the Marches did plant here everywhere in old time for their

use certain medicinal herbs for to cure wounds ; whence it is that some empiric practitioners of chirurgery, in Scotland, flock hither every year, at the beginning of summer, to gather such simples and wound-herbs, the virtues whereof they highly commend as found by long experience, and to be of singular efficacy."

After passing "The Nine Nicks of Thirlwall," the basaltic range, which has extended nearly unbroken from Sewingshields, sinks into the plain, and there comes a stretch of fertile, well-cultivated country, two miles wide or more, watered on the east by the little Tipalt, one of the head waters of the Tyne, and on the west by the Irthing, which runs into the Eden. In the defile through which the Tipalt passes stood Magnæ (Carvoran), the *eleventh* station of the Notitia. Here probably Agricola built a fort to guard the pass by which went the Maiden Way, the great Roman road, which runs up to Scotland, on the west side of the island. It has experienced the fate of other stations, placed in the fertile lowlands, and its remains have almost disappeared, notably within the last hundred years. Fortunately a large number of altars and inscriptions discovered here have been preserved, and have positively identified the spot. The lines of the barrier run parallel with each other, down to the banks of the little raging Tipalt, where stand the ruins of Thirlwall Castle, built entirely of stones taken from the murus. Here evidently was the weakest portion of the whole barrier, as it was far away from the strongly defended positions at both ends of it. Mediæval writers tell us that the wall was first "thirled" or broken through, in this vicinity by the northern enemy, and it is from this circum-

stance that the name of the castle is supposed to have been derived.

This would be the locality of the apocryphal ballad, which Robert Surtees pretended to have taken down from the recitation of an old woman, and which he imposed upon Walter Scott, who inserted the whole of it in "*The Minstrelsy of the Scottish Border*" (vol. ii., p. 26), after having interwoven the following stanza into *Marmion* (canto i. st. 13):

" The whiles a Northern harper rude  
Chanted a rhyme of deadly feud ;  
How the fierce Thirlwalls and Ridleys all,  
Stout Willimondswick,  
And Hardriding Dick,  
And Hughie of Hawdon, and Will o' the Wall,  
Have set on Sir Albany Featherstonhaugh,  
And taken his life at the Deadman's-shaw." \*

Close adjoining Thirlwall Castle is Glenwhelt, about which Scott tells an anecdote to his friend Surtees, who had just played this sad trick upon him, which I will quote, as it has some bearing upon the present state of the wall. In a letter from Edinburgh, February 21, 1807, he writes: "Mr. Ritson, the eminent antiquary was very literal and precise in his own statements, and expecting you to be equally so, was much disgusted with any loose or inaccurate averment. . . . In the course of conversation we talked of The Roman Wall; and I was surprised to find that he had adopted on the authority of some person at Hexham a strong persuasion that its remains were nowhere apparent, at least not above a foot or two in height. I hastily assured him that this was so far from being true that I had myself seen a

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\* *Memoir of Robert Surtees*, by Geo. Taylor—(*Surtees' Soc.* ed. by Rame), pp. 25 and 237.

portion of it standing almost entire, high enough (for a fall from it) to break a man's neck. Of this Ritson took a formal memorandum, and having visited the place (Glenwhelt, near Gilsland), he wrote back to me . . . 'that he had seen the wall, that he really thought that a fall from it would break one's neck; at least it was so high as to render the experiment dangerous.' I immediately saw what a risk I had been in, for you may believe I had no idea of being taken quite so literally." \*

At Wallsend the lines of both murus and vallum are still distinct, but there is not one stone of the wall left upon another. Westward of Wallsend the ditch is of unusually large dimensions, measuring thirty-four feet across the top, and nearly sixteen feet deep.

At the village of Gap, which is said to have received its name from the wall having been breached here, the vallum is very distinct, and stands upon higher ground than the murus. The earth-works are in good condition as far as to the banks of Poltross Burn, the boundary line between the counties of Northumberland and Cumberland, but no remains of the arch by which Camden says that the murus passed the brook are now to be seen. It shows itself again between here and the Irthing; but how it crossed and ascended the other side we have no means of knowing. The cliff here is constantly being undermined by the river, so that all traces of it must have disappeared long ago; but it reappears on the brink above.

There stood Amboglanna (Birdoswald), the *twelfth* and last identified station on the line. It occupies a position commanding and very beautiful, and naturally

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\* Memoir of Robert Surtees, by Geo. Taylor—(Surtees' Soc. ed. by Rame), p. 39.

strong, as the elevated bluff is surrounded on three sides by the Irthing and one of its little branches. It was the largest of all the stations, having an area of five and a half acres ; half an acre larger than Housesteads (Bor-covicus). Its walls are in a good state of preservation and its gateways fine specimens of construction. The murus westward Dr. Bruce considers, taking account not only of the height but the length of the fragment, and the perfectness of its facing on both sides, to be the finest remaining specimen of this great structure.

Here the traveller's excursions will naturally come to an end, unless he feels inclined to take a long and beautiful drive by Lanercost Priory and Brampton to visit the celebrated Written Rock, of which I have previously spoken, on the banks of that pretty little Cumberland stream, the Gelt.

DEFINITIONS OF GEOGRAPHICAL NAMES  
WITH INSTRUCTIONS FOR CORRECT  
PRONUNCIATION, FOR THE VAR-  
IOUS HIGHER SCHOOLS.

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A SUPPLEMENT TO EVERY SCHOOL GEOGRAPHY.\*

BY

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THE IBERIAN PENINSULA.

In the *Spanish* language the single *vowels* sound always as given on p. 516, JOURNAL, 1889:—*y*=*i* in marine. For the most part two joined vowels are to be pronounced a little separated: *Cape Créüs*, *Cape de la Náö*, *Dñero*;— sometimes each one is sounded: *Balē-āres*, *Pity-ūsas*.

The *consonants* are much the same as in English, and *every letter is pronounced*; but

*b* between two vowels sounds like *v* (with which it is sometimes interchanged) as *Cordoba*, *Cordova*; *Habana*, *Havana*; in the beginning of a word it is to be pronounced as *b* (but very soft): *Bilbáö*, *Biscáya*.

*c* before consonants, and before *a*, *o* and *u* is like the English *c* before the same letters; but *c* before *e* and *i*, and *z* before *a*, *o* and *u* are pronounced by the Spaniards in Europe nearly like the English *th*. *Cimbre de Mul-*

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\* Continued from JOURNAL, 1889, pp. 516–525.



*ahacēn. Galiciā, Múrciā, Barcelóna, Palenciā, Valenciā, Ivíza, Zaragóza.*

*g* before consonants, and before *a, o* and *u*=*g* in girl : *Segúra, Segóvíř.*

*j* (and *x*) and *g* before *e* and *i* sound like a "strongly aspirated *h*," as in the German word *máchen* : *Jeníl, Tájo, Jéres de la Frontera ; Cartagéna.*

*gu*=*gw* (*ũ* very short), *qu*=*k* : *Sierra Gũadarráma, Gũadidna ; Gũadalquivir.*

*ll*=*li* (in pavilion) : *Mallórca, Sevilla, Valladolid.*

*ñ*=*ni* (in union) : *Cataluña, La Coruña.*

*h* is mute : *Mahón, Alhámbrá.*

The names ending in a consonant are usually accented on the last syllable, and those ending in a vowel on the penultimate ; but there are some exceptions : *Montserrat, Almadén, León, Madrid, San Sebastián, Santander, Cape Trafalgar, Manzanares, Alcázar, Búrgos, Cádiz ; Menórca, Cape Finisterra, Cape Tarifa, Sierra Moréna, Maladétta ; Andórra, Estremadura, La Mancha, Alicánte, Granada, Pálma, Pamplóna, Salamanca, Santiágo, Tolédo, Córdova, Málaga.*

In *Portuguese* the vowels nearly always sound as in Italian and Spanish, and two joined vowels must be pronounced a little separated : *Bérra, Cõimbra.*

*c* before consonants, and before *a, o* and *u* is like the English *c* before the same letters ; but *c* before *e* and *i*, and *ç* before *a, o* and *u*=*s* : *Cíntra, the Açõres, Bragança.*

*g* before consonants and before *a, o* and *u*, *gu* before *e* and *i*=*g* (in girl) ; *qu*=*k* : *Serra Mantequétta.*

*ch* (and *x* as an initial letter)=*sh* ; *j* (and *g* before *e* and *i*=*zh*) : *Serra Monchique, Téjo.*

s at the end of a syllable sounds like sh : *Elvas, Lagos*.

lh=li (in pavilion) : *Villa-Velha de Rodão*.

nh=ni (in union) : *Mínho* (in Spanish Miño).

Nasal sound ò (as in the French word : *postillon*) : *Cape São* (são) *Vicente*;—ã (as in Amiens) : *Alem* (alã), *téjo*.

The BÆTIS, as its name was in antiquity, is now the GUADALQUIVIR (*Wadi-al-kebir*)=THE GREAT RIVER;—GUADALAVIAR (*Wadi-al-abiad*)=THE WHITE RIVER. The Guadiana has its Greek and Roman name with the Arabic prefix; (*Wadi-Anas*) THE RIVER ANAS.

ALGARVE (in the south of Portugal)=THE WESTERN LAND.

ALGESIRAS=THE PENINSULA (this city is so named from its situation).—ALCÁNTARA=THE BRIDGE (so called after the great bridge over the Tagus, built by the Roman Emperor Trajan);—ALMADEN=THE MINE;—ALCÁZAR (in Toledo and in Seville)=THE PALACE.

The country of CATALONIA (formerly *Gothalunia*) takes its name after the *West-GOTHS*.—CASTILE was named after the CASTLES, erected by the inhabitants for their defence against the Mauritanians. Such castles were first built in the north, and then also in the south of the Sierra Guadarrama; therefore *New-Castile* is situated southward from *Old-Castile*.—The name of the city of BURGOS is probably from the same root as German *Burg*, meaning a CASTLE.

#### FRANCE.

In *French* the single vowels a, e, i, o (without having a mark of accent), sound always like the same short vowels in Italian;—see JOURNAL, vol. xxi, p. 516—y=i; and

most *consonants* have the same sound as in English ; but *c* before *e* and *i*, *ç* before *a*, *o* and *u*=ss (sharp), otherwise *k*.—*ch*=sh (sharp) ; —*j*=zh, *g* before *e* and *i* has the same sound ; *g* before *a*, *o* and *u*, and *gu* before *e* and *i*=g in *girl* ; *qu*=k ; *v*=Latin *v*, German *w*.—*c*, *d*, *e*, *es*, *g*, *s*, *t*, *x* at the end of the syllables are mute, but often make the preceding vowel long : *Mis* (mī).

The *principal accent* is always on the *final syllable*.

Garonne (garónn), Marne, Rhone, Arles, Bayonne, Biarritz, Brest (*t* not mute), Cannes, Crécy, La Rochelle, Lille, Narbonne, Rochefort, Belfort (béfōr, *l* mute).

*ie* is to be pronounced as a dissyllable (*cf.* Triést) : Allier (*r* mute), Guienne, Dieppe ; —*ou*=ū : Adour, Cherbourg, Toulouse, Tours, Boulevard ; è=ē : Sèvres ; —*ei*=é : Seine.

â=ā, ê=ē, ô=ō : Hâvre de Grâce ; —Angoulême ; ē is also expressed by *ai* : Calais (kalē), Epernay ; Aix (ēks, *x* not mute) ; —Saône (sōn) ; —*au* and *eau* have, likewise, the sound of ō : Dauphiné, Bordeaux ; —*u*=ū (German ü in Müller, French *u* in *parapluie*) : Canal du Midi, Bar-le-Duc, Lunéville ; —*oi*=ōā, òā : Loire, Poitiers (*rs* mute).

*ll* was formerly sounded like the Spanish *ll* (li), but according to the modern pronunciation *l* is not sounded at all in such words : Bouillon (formerly bulyō, is now buyō)—Versailles (versāy), Marseilles (marsēy) ; *ng*=ni (as in the Italian Legnano) : Cognac, Auvergne (övērnŷ), Bretagne, Gascogne, Boulogne.

The baptismal name of Jean (John) sounds in the French language zhā̃ ; an, en=ā̃ ; the French have further the *nasal sounds* of ä : en and en (Peter of Amiens

—amyä—), *ō*: on (postillon—postyō), and *ō*: un (the treaty of Verdun—verdō).

*ā* (an, en): La Manche (māsh), Durance, Plateau de Langres; Anjou, Languedoc, Cambray, Le Mans, Nancy, Orléans, Perpignan;—Provence, Canal du Centre, Lorient, Rouen, Sedan.

*ō* (on, om): Golfe du Lion (liō), Mont (mō) Blanc, Mont Cenis, Montmartre, Mont Perdu; Roussillon, Avignon, Besançon, Châlons sur Marne, Clermont, Lyons, Soissons, Toulon;—Franche Comté.

*ā* (ain, in): Saint (sä) Cloud, St. Denis, St. (sät) Etienne, St. Quentin (kātā);—Limousin, Azincourt,—iens=īä: Amiens;—Reims (räs).

*ō* (un): Verdun.

FRENCH: *golfe* (golf)=*gulf*, *pas* (pā)=*strait*, *île* (īl)=*island*, *mont* (mō)=*mountain*, *pic*=*peak*, *roche* (rosh)=*rock*, *plateau*=*plateau*, *comté* (kōtē)=*county*, *canal*=*canal*, *hâvre* (hāv'r)=*harbor*, *fort* (fōr)=(strong place) *fort*; *châtelet* (shātele)=*a small castle*; *place* (plāss)=*place*; *Denis* (denī)=*Dionysius or Dennis*; *Etienne*=*Stephen*;—*lion* (liō)=*lion*;—*midi*=(midday) *south*; *manche* (māsh)=*sleeve*;—*centre* (ssāt'r)=*middle*; *concorde* (kōkōrd)=*harmony*; *grace*=*grace or favor*;—*blanc* (blā)=*white*; *neuf* (nuf)=*new*; *bel*=*beautiful*; *perdu* (perdü)=*lost*; *franche* (frāsh)=*free*; *saint* (sä)=*saint, holy*; *le* (masc.), *la* (fem.)=*the*; *de*=*of*, *du* (masc.), *de la* (fem.)=*of the*.

GOLFE DU LION=GULF OF THE LION; LA MANCHE=THE SLEEVE (the English Channel), so called from its shape;—PAS DE CALAIS=THE STRAIT OF CALAIS;—MONT BLANC=THE WHITE MOUNTAIN;—MONT PERDU=THE LOST MOUNTAIN (in Spain); PIC DU MIDI=PEAK

OF THE SOUTH ;—PLATEAU DE LANGRES=PLATEAU OF LANGRES ;—CANAL DU MIDI=CANAL OF THE SOUTH ; CANAL DU CENTRE=CANAL IN THE MIDDLE (of France) ; —ISLE DE FRANCE=ISLAND OF FRANCE (this region is island-like, surrounded as it is by the rivers Seine, Marne and Oise) ;—FRANCHE COMTÉ=THE FREE COUNTY ;—PLACE DE LA CONCORDE=PLACE OF HARMONY (in Paris).

LE HAVRE=THE HARBOR, OR HAVRE DE GRACE=HARBOR OF GRACE ;—NEUCHÂTEL="NEWCASTLE" (in Switzerland) ;—ROCHEFORT=FORT ON THE ROCK ;—BELFORT=THE BEAUTIFUL FORT ;—ST. DENIS=SAINT DENNIS ;—ST. ETIENNE=SAINT STEPHEN.

CHAMPAGNE=THE PLAIN ;—LES LANDES=THE HEATHS (sandy plains along the Bay of Biscay).

GREEK : πόλις=*city*, and *Gratianopolis*, now GRENOBLE, means the CITY OF GRATIAN (so named A. D. 379) ;—νίκη=*victory*, hence *Nicæa*, now in Italian NIZZA, in French NICE=CITY OF VICTORY.

LATIN : *mons*=*mountain* ;—*provincia*=*province* ;—*aquæ*=*waters* ;—*clarus*=*clear* ;—*trans*=*beyond*.

GALLIA TRANSALPINA=GALLIA BEYOND THE ALPS (so modern France was named by the Romans) ;—*Provincia*, now PROVENCE=PROVINCE (of the "Roman Empire") ;—*Clarus Mons*, now CLERMONT=THE CLEAR MOUNTAIN ;—*Aquæ Sextiæ*, now AIX (founded by Sextius Calvinus 22 B. C.)=WATERS OF SEXTIUS (battle 102 B. C.).

*Aureliana*, now ORLEANS=CITY OF THE AURELIANS (an illustrious Roman family).

CELTIC : *móri*=*sea* ;—*cēbin*=*mountain-ridge* ;—*late*=*marsh* ;—*ardu*=*high* ;—*ar, are*=*on*.

CEVENNES=RIDGE OF MOUNTAINS ;—ARDENNES=THE

HIGH WOOD.—ARMORICA=COUNTRY ON THE SEA (so modern Bretagne was called in the time of Cæsar); ARMORICANS=INHABITANTS OF THE COUNTRY ON THE SEA; ARE LATE, now ARLES=(situated) ON THE MARSHY GROUND.

LORRAINE is a corruption of the Latin *Lotharingia*=KINGDOM OF LOTHARIUS II., who reigned from 855 to 869 A. D.—BRETAGNE=LAND OF BRITONS, a Celtic tribe.—GASCOGNE, formerly *Vasconia*=LAND OF THE BISCAYANS.—NORMANDY is that part of France, which was occupied by the NORMANS or Northmen.—PARIS, in Latin *Lutetia Parisiorum*=marshy city of the PARISII, is named from its inhabitants mentioned by Cæsar.—RHEIMS was in the ancient times the capital of the REMI, a people of Gaul.





# FROM COREA TO QUELPAERT ISLAND: IN THE FOOTPRINTS OF KUBLAI KHAN.

By

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INTRODUCTORY NOTICE OF COREA.—The land of Corea or Chosŏn, for such is the native name of the country, drops down in a peninsula from the Manchurian plateau from the 43d parallel to the 33d parallel north, and is contained within the 125th and 130th meridians east. The northern frontier is marked by the rivers Yalu and Tumen, each having its source (supposed) in the famous *Pak-Tu-San*, Ever White Mountain, a place of many mysteries and innumerable legends. The Yalu running westward pours into the Yellow Sea and the Tumen flowing eastward empties into the Sea of Japan.

The contour of the peninsula is in singular conformity to the shape of a dragon, the ideal emblem of power, which exerts the most potent influence over the Corean mind; which, once swayed by Buddhism and subsequently by the ethics of Confucius, is now almost wholly influenced by Shamanism or the worship of the spirits of earth and air, the Dragon being the supreme agent and recognized alike by prince and peasant. It is not improbable that this configuration of Chosŏn has lent a double significance to "Dragon worship" in which "worship of ancestors" is accounted a mere incident. To establish the comparison, the reader may imagine the dragon's head to rest upon the mouth of the Tumen River in the Sea of Japan, the ears to project to Cape Bruat, the neck to form the indentation at Broughton Bay, the shoulders and back at capes Duroche and Pelissier, the tail at Fusan in the south, prolonged to Quelpaert Island, and the pedal extremities resting upon the islands of the archipelago in the South Yellow Sea and northward in the mouths of the Ta-Tong and the Yalu rivers. The backbone of the dragon on the eastern part of the peninsula is a sinuous range of mountains forming a sort of wall along the Japan Sea throughout the entire length south. The country descends in slopes and circuitous monticules toward the west, forming a succession of fertile valleys through which on their way to the Yellow Sea run the rivers Han, the Ta-Tong, the Yalu and others of less

importance. The climate of Corea is dry and cold in winter, wet and hot in summer. The four seasons in fact are well marked, the three months of spring are mild and temperate, while the autumn months are unsurpassed for their evenness of temperature.

The flora presents a varied and unlimited field of wild specimens, and the mountains which encircle the capital city are adorned in season with flowers of every hue.

The fauna consists of the bear, boar, deer, leopard, and the tiger. The presence of this latter, to be found in great numbers north of the capital and with longer hair and more vigorous body than his Chinese brother from whence through Manchuria he has come to Corea, must vex the naturalist, who will be at a loss to understand why the tiger should have abandoned his native haunts in the jungle to seek the cold and somewhat barren steppes of Manchuria and the distant mountains of Corea. Game of almost every kind is plentiful, and the black and white swan, wild geese, ducks, bustards and golden pheasants abound. The rivers afford fish, oysters, clams and terrapin.

The mineral resources of the country are reputed to be great, and the natives report rich deposits of gold, silver, lead and coal, but for a fact the government hesitates to award concessions to have them opened, alleging that digging into the earth and above all the hill-sides, would disturb the Dragon, and all sorts of ills would surely come out of such desecration. His Majesty Li, however, under a pressure of need of money seems quite disposed to grant concessions now, and only recently an enterprising American missionary visited the United States for the purpose of disposing of royal grants of this nature, but American capital was not allured even by the enthusiastic representations of the sacerdotal agent.

Corea, heretofore known to the outside world as the "Hermit Nation" by reason of her isolation, first opened her ports to Japan in 1876 and in 1882 made a treaty with the United States and subsequently with England, Germany, Russia and France, all of whom maintain, together with China, representatives at Seoul. It is a matter of justice to state that Corea was induced to abandon her policy of seclusion and treat with the outside world—whom she looked upon as "Barbarians from the Western Ocean"—through the friendly offices of Li-Hung-Chang, the liberal minded and distinguished statesman and Viceroy of China.

The change from the old to the new *régime* was not left unchallenged. Corea possessed a large class, and there is but little doubt that she possesses it to-day, a majority who hate the foreigner and who are wedded to the ancient order of things. The *Tai-Wen-Kun*, who was regent during the days of persecution and massacre of the missionaries and their

converts, is no longer in power, His Majesty Li having assumed the reins of actual government in 1873. Although living in retirement the *Tai-Wen-Kun* still exercises great influence, and to him doubtless are due the frequent acts of violence and disorder which have disturbed and even threatened the power of the State, notably in 1882, 1884, 1886 and again in 1888. These biennial revolutions show full well their forecast by the ever potent horoscope guided by the cunning hand of the *Tai-Wen-Kun*. His Majesty Li is descended from the dynasty founded by Li-Tadjo and is the twenty-eighth sovereign of the line. Subsequent to the fall of the Mongol dynasty from the Dragon throne of China in the year 1392, Li-Tadjo, then a young and ambitious soldier, was chosen King of Corea (that is Li-Tadjo murdered the reigning king and succeeded him).

Tadjo, with the instinct of the soldier, caused the capital to be removed from Sunto to its present site at Seoul with a view to utilize its admirable natural defences. His Majesty is known as Tai-Chosön, *Tai-Kun-Chu* (Great King of Great Chosön). He governs with three prime ministers with six boards or departments, each with a president and an unlimited number of vice-presidents. The high rank men are known as *Pansa*, *Champan*, *Chamwei*, with an officer known as *Chusa* who acts as the king's messenger or as interpreter to the different officers.

The revenues are derived from a land tax, the amount of which is an unknown quantity save to the "Chinese-Corean Customs Service," which was organized by China and sent to Corea as a model and which is composed principally of Europeans who have entered that service, and which has been established by Sir Robert Hart. The revenue derived from this service which includes the duties on imports and exports reaches scarcely two hundred thousand dollars, a little more than sufficient to pay the expense of the service itself.

The native taxes are collected by the king and the mandarin class, among whom there is an amicable arrangement as to its distribution, the system bearing a close resemblance to the ancient feudal customs, Corea, in fact, being a feudal government, pure and simple, in which the king and mandarins are after all but feudal barons. Prodigal in the extreme, this revenue is expended in the ever recurring fêtes and festivals, and the government is already deeply indebted to German merchants, who have given it somewhat *carte blanche* in the purchase of arms and the construction of a mint, which is inoperative, because the people refuse to use the newly coined copper money, preferring the copper "cash" of their "daddies," the only money current in Corea.

The discovery of a rich gold mine by the American prospectors, who have recently gone out, is perhaps the only hope to maintain the already seriously impaired credit of the once "Hermit Nation."

The population is variously estimated in numbers at ten to twelve millions of souls, and, more robust than either the Chinese or Japanese, is a type apart from either, and is a composite of the many wild races of the Manchurian plateau, from which it has been evolved. The origin of the Corean people presents an interesting study for the ethnologist, and in this sense as well as geographically the writer was induced during his official residence in Corea to undertake the expedition—an account of which is subjoined, to the island of Quelpaert, or *Chae-Ju*, where he found himself in the footprints of the great Mongol conqueror Kublai-Khan, who undoubtedly constructed the system of fortifications and sea walls, still in excellent repair, and which are garrisoned even now by the descendants of his soldiers left there, and whose very arms and accoutrements are doubtless the same once worn by the veteran legions of the great khan.

The island of Quelpaert or *Chae-Ju*, its native name, is situated south of the peninsula of Corea, about sixty miles, between parallels  $33^{\circ}$  and  $34^{\circ}$  north and meridians  $126^{\circ}$  and  $127^{\circ}$  east from Greenwich.

Forty miles in extent, E. N. E. and W. S. W., it has a breadth of seventeen miles, a high range of mountains traverses its entire length, culminating in the centre by a lofty peak known as HALLA SAN (cloud mountain) 6,500 feet above the sea level.

Two hundred and thirty-five years ago, in the year 1653, the Dutch ship *Sparwehr*, en route from Holland, bound to Nagasaki, was wrecked off the coast of Quelpaert, and of the crew of sixty-four men, thirty-six succeeded in reaching the shore alive. Among these was Hendrik Hamel, who, after fourteen years of imprisonment in Corea, escaped with a few of his surviving companions, and eventually returning to Holland published an account of his sojourn in the land of the "Morning Calm." His story for the first time lent a special interest to Corea, and it was subsequently incorporated in a book published at Amsterdam, 1680, by



Jacob de Meurs, entitled "*Contes des Ambassadeurs Memorables de la Compagnie des Indes Orientales*," and the following extract therefrom is cited as lending a dramatic interest to the island which, besides Hamel, had not been visited by any traveller from the "Western Ocean," nor indeed from any part of the globe, for the inhabitants of *Chae-Ju*, as we shall see, permitted no stranger to visit them. The author of the book, "*Contes des Ambassadeurs*," says :

"The pilot (of the *Sparwehr*), annoyed at not knowing where he was, finally took the latitude of the place and found that it was the Island of Quelpaert, which is in latitude thirty-three degrees, thirty-two minutes. The barbarians, meanwhile, burned all the wood of the vessel, and this nearly cost them their life, the great fire they made having so heated two pieces of cannon that they went off and shattered everything that lay before them in the direction of the sea, towards which they were pointed, though it happened that no men were there. This noise alarmed them so that they all fled as fast as they could ; but they came back soon after and finished their work, when they were assured that the thing would not happen again.

"After this the Hollanders went to see the Governor and made him a present of a bottle of red wine, which he found so good and so much to his liking that he gave them better treatment than they had had, sending them twice a day rice cooked in water; and, moreover, he would have them look on at the punishment of the men who had secretly carried away some fragments of the vessel.

"In this punishment they began by tying the hands behind the back with some bits of the iron that had been stolen; then the men were laid flat on the ground and beaten with sticks on the soles of their feet until they seemed to be half dead."

The amiable old Governor, the account alleges, was shortly after replaced by a man as brutal as his predecessor was kind and gentle. The prisoners endeavored to escape, but, caught in the attempt, they were brought before the Governor, who caused them to be placed in chains, and said :

"What was your plan, and what did you suppose would become of you, wretched men, when you risked yourselves at sea without bread or water or other things necessary to life? They all answered as with one voice that there was no danger they would not face rather than live as they did ; that their comrades in suffering shipwreck had died but once, while the life of those who had fallen into the hands of



his people was a continual death; and there was, therefore, nothing to wonder at if they ran every risk for the sake of liberty, since the very worst that could happen to them was to be punished with death, and they infinitely preferred this to the wretchedness they had to bear when they were prisoners.

"At these words the Governor made a sign to the executioner to do his duty, and at once he gave them, each, twenty-five blows with a stick, which so bruised and battered them that for more than five weeks they were not able to move."

A short time after this rude experience, Hamel and his companions were sent to the mainland of Corea in chains, there to serve out the pains which were theirs during the fourteen long years which elapsed before their escape.

Hamel has said but little about Quelpaert, and the following notes have been collected only after much patient research from Chinese sources, and also from the Japanese. In the "*San Kokf Tsou Ran To Sets*," or *Aperçu Général des Trois Royaumes*, translated from the original Japanese-Chinese by Klaproth, there is the following notice of Quelpaert :

"Tsi-Tcheou Tching is situated to the south of *Nan Yuan Fou*, and upon the island *Nan Pai-Tao*, in the South Sea, and which is also called "*Ile de Tsi-Tcheou*"—*Chae-ju*. The Kings of Chosön established there a city of the second class. It is the ancient *Tan-lo*, where under the reign of the Yuan's (1301), a military as well as naval station was established."

In the history of Corea, entitled *Toung Koué thoung Kian*, cited in *La Grande Encyclopédie Japonaise*, there appears this note :

"Tanlo is an island situated in the sea south of Corea (called on the maps Quelpaert). In the time of *Tcheou Wen Wang*, King of Petsi, the inhabitants for the first time sent tribute to Petsi. There is a mountain which comes up out of the sea. This is what the inhabitants of Tanlo tell about its origin :

"Clouds and mists covered the sea and the earth trembled with a noise of thunder during seven days and seven nights. Finally the waves opened, and there came up out of the sea a mountain more than 100 *tchang* high and having 40 *ri* in circumference. There were neither plants nor trees, and a thick smoke covered the top, which in the distance seemed as if it were composed of sulphur. *Thian Koung*

*Tchi*, a doctor of the Corean University, went to examine the mountain in detail and made a sketch of it. This event happened under the dynasty of Soung in the 4th year of the reign of the King Té (1007 A. D.).

"In the sixth year *Tchaoting* (1233 of our era), and under the Soung dynasty, the Mongol Emperor Ogadaï sent his general, *Sa-li-tha*, to conquer Corea. The latter arrived, and pushing as far south as the royal city, besieged and took *Tchu-jin tching*.

"The Mongols established in the capital and in the other cities a system of inspectors—seventy-two in number—whom they called *Darokuhatchi*. All of these, it seems, were killed by the people of Kaoli, whereupon the Mongols marched an army (ten corps?) against the Kaoli, and taking in turn every city finally established order and peace, and from the year 1264 A. D. to 1294 the entire country was under the banners of the Mongol empire."

That Quelpaert fell under the sway of the Mongol there is little reason to doubt, for we are told by the same historian that when Thei-Tchung Sun was proclaimed King of Kaoli "he was obliged to seek refuge in the Island of *Tchin-Tao* (Chu-Ja?) an adjacent island to Chae-Ju (Quelpaert), where the Mongols followed, punished him, and *re-established* their authority." So much is gathered from the misty pages of Chinese history.

Quelpaert, it must be admitted, is *terra incognita*. Neither before nor since the days of Hamel has a man from the Western world set foot upon its inhospitable shore.\* Like the imaginary "Islands of the Blest" which existed in the poetic fancies of a past age, Quelpaert was an undiscovered country, nor did Hamel's involuntary visit throw light upon the strange island and its people, for it must be understood that during his stay he was a prisoner, and with his comrades was speedily transferred to the mainland of Corea, to which country there has been a nominal attachment.

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\* A ship was wrecked several years ago on the coast, but the survivors were sent off immediately to the mainland, and thus cannot be said to have visited the island.

The writer, then Secretary of the United States Legation and Consul-General in Corea, was induced to undertake the journey of exploration of the island from the foregoing facts, and, if possible, find there a clue to the somewhat mysterious origin of the Korean people, whose type, neither Chinese nor Japanese, would seem to point to a composite race formed from the various hardy clans which had followed the standards of the great khan in the overflow of the Manchurian plateau whence had come the Kitain, Mongol, Tartar and Turk, out of which had sprung the Korean.

In the month of August, 1888, after much solicitation the Government of His Korean Majesty Li acceded to the writer's request, and through His Excellency, Cho Pyong Sik, the President of the Korean Foreign Office, a special passport or *quanja* was furnished. It is true Mr. Cho said: "You will not be able to go, nor should you persist, the people of the island are savages, and His Majesty greatly fears that harm will come of your visit." Notwithstanding the cold comfort of this counsel, I engaged an interpreter and cook, and fixing upon the port of Fusan as the best point of departure for my destination, I left Seoul on the 4th of September, 1888.

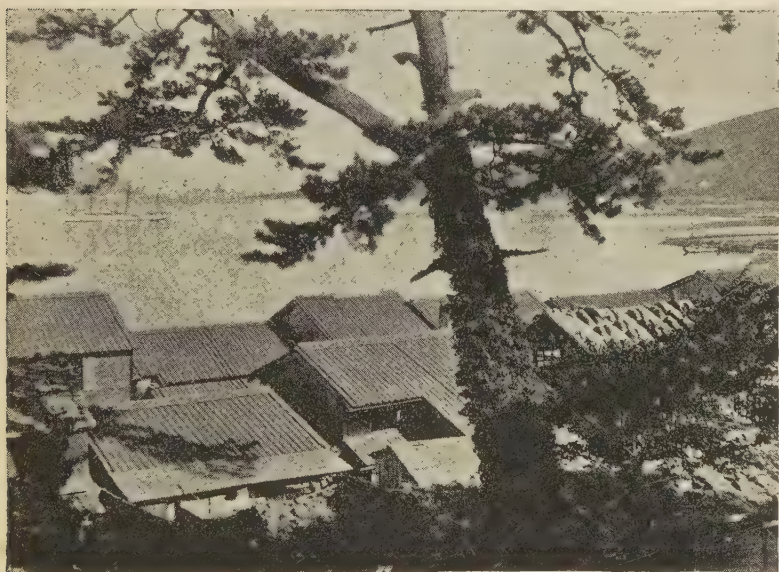
#### I.—THE DEPARTURE.

1888, 5th September.—On the 5th of September, accompanied by Kim Wone my interpreter and Chung my cook, both Coreans, I took passage on the steamer *Higo Maru* from Chemulpo to Fusan, where I proposed to engage a boat for Quelpaert.

As the *Higo* steamed out of the harbor of Chemulpo the U. S. vessel *Essex*, then in port sent up her

signals to wish me success and *bon voyage*, to which the *Higo* responded in my name "Many thanks."

On the morning of the 7th we were at Fusan ; it so happened that no boats were in port and I was told that it would be necessary to wait for several days. Kim and Chung with luggage went on shore, while I decided to profit by the delay, proceed in the *Higo* to Nagasaki



FUSAN LOOKING SEAWARD.

and completing there my supplies, return by the same steamer to Fusan.

In Nagasaki I was entertained by my numerous naval friends, officers of the U. S. vessels the *Palos* and *Juniata* ; by the genial American Consul Mr. Birch, and by my friend, J. M. Stoddart, a grand whole souled son of Scotland, who obliged me *vi et armis* to quit my hotel

to become his guest. Whilst in Nagasaki S. induced me to take a *jinriksha* and visit the boiling springs of *Ungen* and *Obama*, 30 miles distant, a most novel and interesting sight, to say nothing of the magnificent and picturesque scenery along the route. I was enabled also to have a glimpse into the inner life of the peasant people, and of course was elegantly entertained in the superb tea-houses—refectories—which distinguish the Japanese above all other people. At *Ungen* and *Obama* I had a peep into bath houses where fifty or more natives of both sexes and of all ages were bathing together perfectly unconscious of any infraction of law, moral or otherwise. Nor was there infraction of any Japanese law, nor was there the slightest intimation of rudeness or vulgarity. *Honi soit qui mal y pense* seemed to be written in these simple, happy hearted people's minds, and was certainly strong enough to preserve a decorum that was irreproachable. In the Western world it would have been called "shocking!" in Japan it was not considered at all bad form, another proof of the maxim *autres peuples, autres mœurs*.

Returning, the *Higo* stopped at the *Gotos* and *Tshushima*s, "beautiful isles of the sea," where I went on shore and roamed about for several hours amid the peaceful shades and cool sequestered vales, where devotees of Buddha with an eye to the beautiful have placed their shrines. On the 19th, I was back at Fusan. Installed at the hotel "Kokei-ti," I set about securing a boat. Mr. H., the collector of the port, had made every effort for me, but as yet in vain. Finally, he kindly accompanied me to enlist the aid of His Excellency, *Yu Kee Han*, the Korean Superintendent of Trade. The latter put on his



official robes and took us on board of a Corean junk whose captain he supposed would immediately incline to his wishes and treat with me, but not so; the captain positively refused and said: "I will not take the foreigner to Chae-Ju. Kill me if you will now, for if I took him I should be killed. No man can go to Chae-Ju." Mr. Yu was furious: he caused the captain's hat to be knocked off, the greatest indignity a Corean can suffer, and ordered him to be marched off to prison, but I intervened and had him released. The incident was discouraging and served to show me the impossibility of securing a Corean junk in Fusan.

Through the kind interference of Mr. Murota, the Japanese Consul, I was at length furnished a Japanese boat, a *Sampan*, a mere fishing skiff, but reputed a good sea boat. I was told that I could make the journey with this through the Inland Sea, and arriving at Soando, the extreme southwestern point of the Corean peninsula, there procure a Corean junk with which to make the difficult *traversée* to Chae-Ju. There was no other alternative, therefore, and I at once concluded an arrangement with the Japanese captain and his crew of four men. Our *sampan* was little more than twenty feet in length and six feet in width, and, what with myself and personnel, must contain eight souls, a fact which added greatly, as may be imagined, to the risk of the undertaking, "What," I asked Mr. Murota, "will the people of Quelpaert think of such a journey?" Five hundred miles in such a tiny craft would certainly prove to be a surprise even for such "toilers of the sea," as the pirates of Chae-Ju, should we be compelled by chance to make the entire journey in the *sampan*.



## II.

On the afternoon of the 22d of September, our luggage being safely stowed on board, we bade adieu to the entire European colony, five in number, assembled to see us off, and having set our somewhat primitive sail, we glided swiftly out of the harbor amid the cheers and waving of handkerchiefs of our friends, and favored by a good stiff breeze Fusan soon faded upon the sight, and ere nightfall we had entered the Inland Sea, not less beautiful than the famed Inland Sea of Japan. After sun-down the wind had freshened and our boat, which we baptized the *Bravo Maru*, danced and beat the sea in such a violent way that it was decided to run in under the shore, and, finding that this was attended with some danger, to anchor for the night under cover of a friendly headland.

At sunrise on the 22d the *Bravo Maru* was again under sail, and bounding along with a fair wind on our quarter.

The Inland Sea was quite unknown to Europeans, and had been navigated till now only by Japanese and Korean fishermen. Like the formation of the mainland, the sea itself is a succession of basins formed by a circular range of cold grey peaks and cones, whose bare and pointed summits, like church spires or castle turrets, cut the air with such symmetrical lines that they seem fashioned by the hand of human art, or, assuming some fantastic or diabolic shape, appear the device of demons. Even so in the Inland Ocean. Here are the same granite giants grouped in amphitheatral array, rising out of the sea instead of the valleys. They envelop, seem to follow you as you sail along and, clos-

ing around you at times, bar the passage. A color is given to the beautiful panorama by cultivated patches of green on isle and mainland and by the contrast with the deep blue of the water. At sunrise, when the sun flashes its first rays upon the horizon, it covers these solemn stony sentinels with a blush of purple and gold which defies the brush as well as the pen of the most inspired artist and writer to portray.

*25th September.*—On the 25th, at night, we ran into *Soando* (placed on the Admiralty chart as “Crichton Harbor”). It was from this place I proposed, if possible, to obtain a Korean junk with which to make the somewhat dangerous *traversée en pleine mer* to Quelpaert. Although quite dark I immediately landed, and accompanied by Kim took my way to the village, to which we were guided by lights and by the barking of dogs. After some difficulty we succeeded in awakening the people, who gathered from all quarters of the town and stared at us with amazement and fear depicted in their faces. Kim’s Korean costume and our passports and *quanja* finally reassured them, and shortly after the chief, who had doubtless been waiting developments, arrived upon the scene.

We had been told that a mandarin was in command, but the chief proved to be only a “low rank man.” He was a very good fellow, however, and when he had carefully looked over our papers and became convinced that we were friends, he advised us to move our boat to a more secure harbor and sent with us a man as a guide, promising to call upon me in the morning.

*26th September.*—On the morning of the 26th the chief, accompanied with his escort, came to see us. We

received him with marked consideration, and at the end of a long *séance* I broached the question of the Corean junk with which to make the *traversée* to Quelpaert. The chief insisted that there was but one boat in port, pointing to a miserable looking craft which was moored near by and which, by parenthesis, was then serving as a *pig-pen* !

I was, I need scarcely add, greatly discouraged by this *dénouement*. As I have said, I dreaded to take the open sea with my *sampan*, and dreaded also to be handicapped by my Japanese sailors, for between the latter and the Coreans there has been bad blood ever since the terrible invasion of the armies of the Tycoon, the horrors of which are still fresh in the minds of the Coreans. This feeling promised to be more pronounced in Quelpaert on account of the incursions made by Japanese fishermen upon the fishing reserves of the people along the coast. In my dilemma the chief proved to be my *mascot*, for when he had been well filled up with wine by Kim he became most generous, and said : " Say to the *Taïne*\* that I have a pilot here, a man from Quelpaert who will take him across to Chae-Ju." Suiting the action to the word, he sent off for the man, and presently he came, a tall brigandish looking fellow, apparently 60 years of age. The chief called him up, made him sign a paper, which he presented him, and in a few moments *Yang Man Tuk* took his place on board, happy in the prospect of returning to his home. I re-engaged my Japs for the round trip, and the matter was thus settled.

*27th September.*—The 27th was passed in the harbor

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\* *Taïne*.—A term applied to all persons belonging to the upper classes.

of Soando waiting for a fair wind. During the day I was given an opportunity of witnessing the expert manner in which the Japanese catch *tai*, a very fine fish resembling our red perch, and when wearied of the sport I went on shore with my camera and photographed the port, and the people who had assembled to have a look at us. At 5 p. m. *Yang Man Tuk*, with the instincts of a sailor, announced a change of wind. Standing on a ledge of rocks near by the *Bravo Maru*, he pointed toward Quelpaert in the south, and looking toward me, said :

“ *Taïne ouriga Chae-Ju ril niil pogesso*.—Excellency, we will Chae-Ju go to-morrow see,”—being the literal translation. The attitude and pose of Tuk were inimitable ; bidding him keep his position, I brought my camera to bear upon him, securing thus not only a portrait of Yang Man Tuk, but at the same time a picture of little *Bravo Maru* in the bay of Soando.

Following the directions of our pilot we got under way at sundown and pulled out to Advance Island, a distance of ten miles or more, and there under the lee of the rocks in a little port we cast anchor and spent the night.

*28th September*.—Tuk proved himself a prophet, for at 4 a. m. the watchful captain announced a fair wind and shortly after the *Bravo Maru* was on her course, pointed for Quelpaert, whose monster outlines could be seen even through the mists of morning in the far distance.

The little craft when fairly out upon the open sea was shot along upon the rough billows rather than sailed. A big sea was on, and I fully realized the danger as she was followed by both wind and wave, which threatened

to topple us over completely. Reef after reef was taken in under the orders of Tuk, who sat the while in the prow serving as ballast as well as pilot, grimly smoking his pipe; Kim and Chung were much too busy in arranging their accounts with Neptune to note the danger. As for myself I had ample time to reflect upon the probabilities of reaching Quelpaert, and it was by no means reassuring to see that Tuk had abandoned his pipe and watched carefully the little boat lest she should be swamped.

At noon Halla-San towered above us in all his majesty, and an hour later, half drowned with the seas which had washed over us during the entire trip, we passed from the dangers of the sea into the port to enter upon another phase of peril which menaced us from the land, for the grim, black rock walls of the port fairly swarmed with human beings attracted by our approach. We had arrived at Quelpaert! Should we be allowed to land? And if on land should we be permitted to return? With these reflections and the recollections of Hamel in chains passing in my mind, our little boat glided into the smooth waters of the interior port.

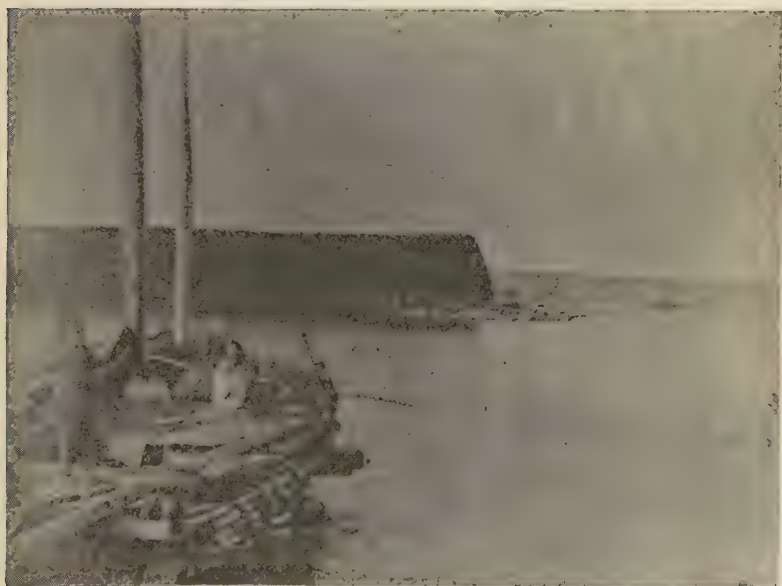
### III.—THE PORT AND CITY OF PELTO.

As we neared the shore there was a clamor of voices from the multitude, a wild, savage looking set of men, in whose fierce faces there was blended an expression of astonishment: "Who are you?" "Where are you from?" "Why do you come here?" "No foreigner can land in Chae-Ju; be off." These and other expressions, insulting and defiant, decided me that any attempt



to land for the moment would simply cut short our career in Chae-Ju. "Kim," I said, in a stern way, for I saw he was weakening badly, "stand up and show your Korean dress to these people; tell them "to hold their tongues, we do not care to land until the mandarin so orders. Send your chief to us."

The very audacity of the challenge amazed the mob,



PORT PELTO.—SEA-WALL BUILT BY THE GREAT KHAN.

and in a moment a man came forward, took our proffered papers—passport and *quanja*—and disappeared, followed by a curious crowd, eager to learn the reason of our visit.

"A foreigner come to Chae-Ju; what an impiety! What a calamity!" Such were the muttered ejaculations of those who remained and looked down upon us



from the walls, or jostled each other for place along the quay to catch a glimpse of the white man. The situation was novel, but it was not new. It brought to mind my *entrée* into the capital of Uganda in 1874 and the thousands who thronged to catch a glimpse of me and my horse—for white man nor horse had ever been seen before—and then when they saw me dismount! their flight in terror at the unlooked-for sight, for they had taken me for a centaur!

In Quelpaert it was the *white man* alone, and not the horseman, who engaged all the attention of the people. Nor was there much fear that my visit, as in Uganda, would be attended with the bloody drama which was one of the special privileges of King M'Tsé—continued even after his *conversion* to Christianity. Let me hasten to anticipate my story and reassure the reader, for happily, the human sacrifices made in my honor in Uganda have no place in my experiences in Quelpaert.

Whilst waiting for an answer from the Governor, and somewhat reassured by the calm which had succeeded the storm of excitement with which we had been welcomed, I had time to take a look at the port and the city from the boat.

The port of Peltó is formed within two projecting hills which jut out from Halla-San, comparable to the fore-paws of some colossal sphinx. Within the space embraced by these projections there is a sort of bay, in which, extending from the city wall, are several lines of breakwaters constructed with much care and skill, all of which—city walls and breakwaters—are built with a black volcanic rock several feet thick and sufficiently high to afford protection for the small craft for which it

is destined. An exterior line run from one point to the other would constitute, at small cost, an admirable port for steamers and vessels of large draught.

The city of Pelto is known to the modern cartographer as "North City," in default of any other name. It is built in the valley, or, rather, on the hill-side, for Halla-San, as we have said, runs out to the sea—from out of the sea I should say, to follow the legend. The city consisting of 600 houses, perhaps, with the usual Korean enumeration of five souls to the house, gives a population of three thousand. The houses are built of black rock, with thatched roofs. Surrounded by a wall of the same material, the town has an air of solidity which gives it the appearance of having been a fortified place. In fact, it is out of this very port, doubtless, that the Mongols sailed with their fleets to prey upon the commerce of that day, and here, perhaps, was the *chef-lieu* where they organized their successful invasions of Corea.

Night fell and still no answer from our dispatches; the wind went down somewhat with the sun, but was from the north, and consequently adverse, should we be obliged to "scuttle out." To meet any emergency we literally went to sleep on our oars, our Japs being warned that if hostility should be shown we were to cut and run, but that no one was to "board ship" under any pretext. To enforce this we were to use our knives, with which we were all well armed.

*29th September.*—At 2 A. M. we were challenged—"a messenger from the Prefect of Police!" Awakened, I told him to ask the man, who appeared in a boat, accompanied with several others, what they wanted; they

replied: "Mr. Kim to come on shore, the Prefect desires to see him." "By no means," I cried—"come in the morning, Mr. Kim can't see you to-night." And the messenger disappeared in the darkness. The incident was calculated to make us somewhat nervous as to its real intention, and for a certain time it seemed as if the precautions taken as to defence were most seasonable.

On the 29th I waited until 10 A. M., and was about to send a messenger to the Prefect, when he sent a *kissu* \* to request that Kim should come on shore because he wished to arrange for my reception. Kim accordingly arrayed himself in his gala clothes and sallied forth, and returned about an hour afterward with the information that the tent being erected on shore was put up for my reception. At noon there was a blare of trumpets, with discordant notes of Corean reed instruments and the bagpipe—the Scotch bagpipe being certainly of Corean origin (?)—the strange cries of coolie servants, bearers of sedan chairs, and then two standards were planted at the tent door, from which floated banners of orange and red colors and on which were painted strange devices. Behind these came the Prefect and his escort. When the officials had entered the tent a messenger came to say that the *Taine* was awaited.

I was dressed for the occasion in a uniform which had seen some service, but was still elegant and attractive. The gold lace and rich braid struck a chord in the fancy of the people who crowded about us, as accom-

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\* *Kissu*, a corps of independent soldiers employed in Corea as messengers by all officials.

panied by Kim I proceeded to the tent, around which surged and struggled a mass of men—to get a look at me—and who were kept at bay only by a number of policemen armed with a formidable paddle known as *conjang*, an instrument—an enormous paddle—which in Chae-Ju, as in Corea, inspires the public with some respect, for without the *conjang* it is difficult to command the respect of the multitude. The paddle does this effectually. Entering the tent I found myself in the presence of two officials dressed in a costume resembling that of the ancient Tartars; the black felt bell-crowned hat, with peacock feather and long red tassels, being its chief feature. The Prefect of Police—for such I learned was the office of the chief—as well as his aide-de-camp, who sat beside him, wore immense colored crystal goggles after the manner of almost all Oriental men of rank, ostensibly for protection to the eyes, but in reality a pure affectation, which is supposed to lend dignity to their bearing. As I looked around me the scene was novel in the extreme, and not a little embarrassing. All eyes and necks were strained in the effort to get a look at me, and hear my response to the interrogatories addressed me by the Prefect. “Who are you? Why did you come to Chae-Ju, and why did you come alone? Chae-Ju, you must know, is forbidden land. Are you a missionary?” Notwithstanding the gravity of the situation I laughed outright at this last question, and answered: “Do I look like one?” pointing at the same time to my uniform. In turn they laughed and said: “No, you do not, in fact.” I could only surmise that the official had come from Corea and had imbibed there the prejudice against the missiona-

ries, and hence the query. To all of these interrogatories I plead my passport and *quanja*, and turning to the Prefect, said: "My business is with the Governor; why does he not receive me?" To this no reply was vouchsafed. One of my Japanese sailors was sent for and his answers to a multitude of questions were duly enregistered. The date of our arrival, names, etc., were inscribed, to all of which we were asked to affix our signatures. This may serve some future Oriental society in Chae-Ju a thousand years hence to commemorate our visit, or "to point a moral or adorn a tale" to be told by some future voyager.

As usual on such occasions a repast was brought in consisting of fried sea-weed, fish, *chun-boc*, rice and other edibles, the character of which was unknown to me. *Sul*, an extract of barley common in Corea, was also served. I partook of the sea-weed and drank the *sul*. Kim said to me after he had watched me for some time: "Don't eat the food nor drink the *sul*, it may be poisoned." "You are a fine fellow," I said, in disgust. "Has it only now occurred to you to counsel caution when you have seen me take enough to settle me?" The general conversation of the officials, in which the attendants joined, ran upon the quality and cut of my clothes. The people of Quelpaert, in common with those of Corea, are maniacs on the subject of dress. An outward appearance of clean linen is indispensable to the gentleman, however unclean his person or undergarments. My field glass was the next special object of wonder. In fact it had already won for me special consideration in Corea, as well as in Chae-Ju. When shown how to use it and directing it towards Halla-San they could plainly discover objects thereon,



they held out their hands as if to touch the mountain, and said, "this is surely magic." When in Uganda I won the favor of the king and the people with a galvanic battery, and became in their imagination a sort of *Deus ex machinâ*. In Quelpaert I won the esteem of the people with my field glass, assuming in their eyes to be possessed of a power as great as that of a *Dragon* and the "All seeing Argus."

Finally, wearied with the audience, which seemed interminable, I arose to go, bowed myself out, and followed by the people returned to my boat. Later on the Prefect came to see me, and Kim entertained him for several hours. He made him a few presents, and the Prefect finally said, that he hoped during the night to have a reply from the Governor. Kim said to him that I was quite tired of the delay and that I protested against my being compelled to remain on my boat, for the reader will understand that neither myself nor people were allowed to land for a moment; we were in fact prisoners.

#### IV.—CHU-SONG, THE CAPITAL CITY.

*30th September.*—During the night, as promised by the Prefect, he sent a message to say that orders had been received from the Governor to escort me to the capital at 10 A. M. Official recognition, it was evident, had dispelled all idea of violence, judging from the changed attitude of the people, which was no longer one of menace, but still of insatiable curiosity. At 9 A. M. the whole town was in an uproar, there was a clanging of rude instruments, the screech of ear-racking pipes or flutes, and the gathering of the queer host which com-



posed our escort. The Prefect and his subordinates were out in their gorgeous and vari-colored robes. At the last moment he came to say that the Governor had ordered one of my Japanese sailors to come along also. "Why?" I asked, rendered somewhat suspicious of such a strange request. In fact I felt no little uneasiness on this account, knowing the hostility of the people generally to the Japanese. My fears fortunately were groundless, for he passed through the ordeal all right.

Promptly at 10 o'clock, in full dress and accompanied by Kim and Chung, I bade our Japs be of good cheer, warning them not to leave the boat upon any pretext whatever, and left them, promising to be absent but a short time. We passed through the town on foot, accompanied by the Prefect, and joined the escort which awaited us.

The spectacle which met my gaze was startling! Mounted on little ponies I beheld two hundred or more men, holding in their hands, each, a banner or flag on which was inscribed some strange device. Their dress consisted of a complete coat of mail, whilst on their heads they wore a round copper or brass helmet surmounted with a heavy spike. From the helmet a curtain of plated leather fell upon the shoulders, and down over the faces of the warriors themselves a mass of long black hair straggled in disorder, lending to the great black eyes, set in faces bronzed to a mahogany hue, an expression of brutality, anything but pleasant to the sight. Covered with dust and clothed in a dress several centuries old, what wonder that I started as at a ghostly apparition of what seemed a detachment from the armies of Genghis and Kublai Khan, or again a part of the

conquering hosts of the Mongol emperor, who set his seal of empire upon *Tanlo* as early as 1233?

These rough looking soldiers interested me strangely. It was in fact the grand object of my journey, as I have said, to mark the difference between the confused types in Corea and these people, who, I assumed, would show by reason of their isolation a more distinctive and pronounced type of the race to which they belonged.

It was only too manifest that the men before me, the traditional and professional soldiers of Chae-Ju, had descended from the time, 650 years before, when military garrisons had been placed in the island. Their arms, of the most primitive pattern, and accoutrements and armor, all bore the imprint of great age and were undoubtedly the same which, handed down through successive generations, had been worn by their valiant warrior ancestors in their conquest of Corea and their final occupation of *Tanlo*.

Whilst I indulged in these speculations the column formed, the bugles, accompanied by the shrill notes of the bagpipe, sounded the march, and in single file it moved on. Not so, however, the wild little mustang which had been designated as my mount. Untamed and unbroken, he certainly was, for the two men who held him by means of ropes on each side kept the beast at arm's length and durst not approach him. I mounted at length by a ruse, and then commenced a series of gyrations and gymnastics which I have rarely seen equalled, even in the camp of Buffalo Bill. When the brute had well-nigh kicked himself out of joint he finally concluded to join the march, but after a short distance refused to move. The column halted again, and quite in despair I dismounted,

having won some applause for not having had my neck broken, as I had every reason to suspect had been the intention of the Prefect in giving me the brute.

A march of two hours brought us to the south gate of *Chu-song*. The approach to the capital leads through a narrow street, flanked on each side by high black walls which deflect from the main wall which incloses the city itself. The ponderous gate was shut, and we were obliged to dismount and wait the orders of the Governor to open it, this being an ancient custom in Quelpaert where, contrary to the rule in Corea, the gates are never closed either night or day, except on the occasion of the arrival of a guest.

On the walls of the city on all sides swarmed a mass of human heads who peered down from their perches upon us, or crowded around to suffocation to catch a glimpse of the stranger. An hour of this painful ordeal was passed, in which I was subjected to a good deal of rude jostling. One fellow came up and thrust his face close to mine, leered at me, and, like some insolent *gamin*, said boo ! boo ! as if to frighten me, all of which caused no little merriment among the crowd. The Prefect all this time stood aloof, and Kim and Chung provokingly clung to him and seemed afraid lest the people should identify them with me. Fortunately, at this juncture the Governor's commands were received, the gates were opened, and, remounting, we filed into the streets of the capital. As the column passed through the dense mass which blocked the way, the *conjangs* were applied to the backs of the people most unmercifully by the guards, who ran along on each side of the column, shouting and gesticulating.

Proceeding a short distance, the head of the column suddenly turned westward, and after a march of five minutes debouched on a broad plaza, on each side of which were drawn up in single file, a hundred or more soldiers, the counterpart of those who composed my escort.

At this moment a gun was fired ; it demoralized Kim completely, and I confess that I was somewhat startled myself, for I did not know its significance. It might have been the signal for a fête or an execution. Evidently Kim thought it was the latter, for he broke away from me and disappeared in the crowd. I called him back, reassured him, and together we followed the master of ceremonies, who now approached and conducted us through the dense mass of people and along the lines of as wild and barbaric looking men as it is possible to imagine, and whose forefathers, perhaps, had received in some such fashion the visit of the great conqueror of that day, Kublai Khan.

At the end of the broad plaza stood the audience hall, where sat the mandarin surrounded by all the paraphernalia and people which hedge about a throne. The Governor of Chae-Ju, in fact, is an uncrowned king, but his authority is by no means absolute, as he himself confessed to me. Led by the master of ceremonies, we reached the steps of the audience chamber. Kim there left me to enter by a side-door, whilst the master of ceremonies threw himself upon his hands and knees, where he remained, until passing quickly through the passage way I gained the presence of the mandarin, and with uncovered head took the proffered seat of honor on his left, beside which now stood my interpreter Kim.

The Governor was a man of perhaps fifty years. His features were cleanly cut and his face clearly of the Tartar type, although somewhat obscured by a pair of huge spectacles of smoked glass. Dressed in a court costume of rich and vari-colored silk, his hat of black felt was ornamented with the decoration of a peacock's feather and other insignia of high office. He opened the conversation by expressing regret at the delay in according me a reception. Dropping his voice to a whisper, he said to Kim: "Say to the *Taine* that his visit has caused me great trouble, and I fear much for him as I do for myself. Two hundred people have come to me to protest against his coming here, or his being allowed to land as a violation of the laws of Chae-Ju. I have," he continued, "told them that you are neither missionary nor merchant, but a representative of a foreign nation and a friend of Corea. This has appeased them, but as you value your life do not attempt to go up to the top of Halla-San, and go away as soon as possible." The Governor added: "One hundred days of sacrifices must be performed in any case before attempting to climb the mountain in order to propitiate the spirits of Halla-San. If this be not done great evils would surely follow, and this is the great cause of the people's hostility. I could not protect the *Taine* against the fury of the people."

"Tell his Excellency," I said to Kim, "that the *Taine* did not come to Chae-Ju to violate the customs of the people or bring upon them the ills which he says would follow. The *Taine* will not go to Halla-San." This announcement caused a murmur of approbation



to run through the assemblage, and the Governor was apparently much gratified.

A *chow* (repast) was brought in, of which I partook sparingly. During this time Kim was asked a thousand and one questions about myself, and what he didn't know he supplied from his fertile imagination, and if the Governor should be addicted to writing history I am certainly booked for a place in the annals of Chae-Ju not less grand than that of the great Khan.

Finally, the Governor perceived that I had quite enough of him for that day, and, much to my satisfaction, he turned me over to his master of ceremonies, whom he ordered to conduct me to the quarters to which I had been assigned. Shade of Hamel! I shall ever have cause to remember my habitation in Chae-Ju. I spare the reader the description. "Kim," I exclaimed, "they gave me a pony this morning to break my neck, and now we are to be asphyxiated. The Fates of Chae-Ju are implacable." Kim, as well as Chung, however, seemed much pleased and the reason was made apparent, for I heard Chung say: "Master no likee; stinkee muchee, he must go away." Chung was right, for no human being could withstand the awful odor of the place. "Ask for a guard," I said to Kim, "I will do this place up as speedily as possible; observations and photographs in the morning; back to Pelto at night, *you savez?*"

V.

Chu-Song is situated perhaps a mile from the sea, and certainly not more than five miles from Pelto, its port. Seen from an eminence it presents the appearance of a Corean city, but the houses, though rude, are



much more solidly constructed. The streets are wider as a rule than those of Seoul, dirty of course, but devoid of trenches, nor so horribly foul as the latter city.

The wall which encircles the city is quite twenty-five feet high, built of black volcanic rock, mounted at intervals with towers and turrets, which serve as lookouts. Three gates give entrance to the city: Tong-Mou, east gate; Su-Mou, west gate, and Nam-Mou, south gate. The three principal cities of Quelpaert are Chu-Song, Chong-Hai in the east-southeast, and Tai-Chong\* in the southwest. Chu-Song has a population roughly estimated at 25,000, the other cities 5000 each, the entire population of the island reaching certainly 50,000.

The public building is the audience hall, an imposing structure built in the Chinese Yamen style. It has evidently been renewed of late years, rather built anew, for alongside of these comparatively new buildings there stand the ancient structures falling in ruins. A large bell within a kiosk stands on the right of the audience hall, something after the model in the *Chong-No* at Seoul. What its particular office is I could not learn absolutely, except that I was told that it was tolled to keep off the evil dragon. It was not to ring the people in doors at night, or toll the women out, as in Seoul, nor close nor open the gates, for none of these customs prevail in Chu-Song. The gates are never closed except upon such occasions as we have cited, and both sexes are free to circulate at all hours, day or night.

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\* The harbor of Tai-Chong, known as Yung-Su, is a good port in which large vessels and steamers can find good anchorage. It is said to be the very best harbor of the whole coast.

The country from Pelto to Çhu-Song is well tilled, and as far as the eye can reach over hill and dale and far up the sides of Halla-San, there are cultivated patches well inclosed by walls built in squares, I was told, to protect their crops against the incursions of wild animals. The principal cereals grown are beans, peas, barley, millet, buckwheat and wheat, with also a little rice, but wheat is the staff of life, which may account for the good physique of both the male and female.

Oranges, limes and several kinds of nuts and plums are plentiful. The fauna consists of the wild boar, bear and deer. The natives assured me that there were great quantities of wild geese, swans, golden pheasants and quail, but I cannot vouch for the statement, for I saw none during my stay in the island.

The islanders are, of course, fishermen, and use for their trade a sort of double decked raft, a curious arrangement, great numbers of which may be seen near the port of Pelto. A monster bivalve called *Chun-boc* is found here in great quantities. The clam, for such, in fact, it is, is greatly prized as an article of food when dried, and the shell furnishes a beautiful *nacre* or mother of pearl. The Japanese fishermen along the coast have discovered this, and, when they dare, approach and stealthily fish and even barter with the natives, whose prejudices yield at times to the tempting offer of cloths and small wares offered in exchange. The *Chun-boc* taken to Fusan is exported to Japan, where it is greatly valued for the inlaid work and ornamentation, in which the Japanese show great skill.

Hamel, in speaking of the Coreans, said: "As for

religion, the Coreans have scarcely any. They know nothing of preaching or mysteries, and therefore have no disputes about religion." This is most true of Quelpaert. The religion of Buddha entered Corea in the fourth century and reached its apogee of power and splendor from 960 to 1592, A. D. It built splendid monasteries and temples, some of which are still maintained, but religion and temples are fast dying out of Corea. The accession of Tadjö to the throne of Corea sounded the knell of Buddhism in the land. It is difficult to ascertain how it was accomplished, but it is a significant fact that the priests who once represented a refined and cultured religion are at this moment relegated as soldiers to the defences of the mountain fortresses, which were the inspiration of this soldier king, who by thus secluding them secured not only the best soldiery for defence, but struck a fatal blow at the same time to Buddhism, which from that moment perished for want of contact with its natural sources. Buddhism in Corea was the mother of that art and literature which seem to have astonished those, who have found it curious that a people reputed barbarian should possess the elements of art. It was not, however, in any sense a Corean art, but an exotic plant brought from India, doubtless at the same time that it introduced an alphabet which, notwithstanding its association with the Chinese, is distinctly and particularly Indian. M. Léon De Rosny in his book entitled "*Les Peuples Orientaux connus des anciens Chinois*," says *à propos* to this subject :

"Les migrations indiennes qui ont apporté, dans le pays de Tchao-sien (Chosön), les caractères indiens, n'ont pas été sans y introduire les grandes doctrines du

brahmanisme et du bouddhisme, et, avec elles, les principaux monuments de la littérature hindoue."

To those who have claimed that it was from Corea that a religion and art were introduced into Japan, it is only necessary to reply, that the undisputed fact is only another proof that it was neither Korean nor Japanese, but, as M. Rosny has asserted, Indian. Every vestige of a pseudo Corean art has faded and gone since the temple was closed, and the so-called literature of Corea exists to-day only in an affectation of Chinese letters. Buddhism, it is certain, obtained a footing in Quelpaert, for along the streets through which we made our entry I did not fail to remark four large statues of Buddha, hewn from solid black rock and worn and defaced by the hand of time.

The religion of Quelpaert, like that of Corea, is simply a belief in the spirits of earth and air, an admixture of the worship of ancestors, with some idea of the transmigration of souls, but over all the Dragon power is the predominating element. The mountain Halla-San is the spirit god of Quelpaert. All trace of Buddha has gone save the stone images which the Mongol conquerors had failed to destroy.

#### HALLA-SAN.

Halla-San, lofty, grand and majestic, casts its shadow over the city of Chu-Song, as it does over Peltó. From the piazza of my house in Chu-Song, the view of the mountain was surpassingly lovely. Immediately to the south there is a large orange and lime grove from which a delightful and refreshing aroma is exhaled, which touches our olfactories now and again, render-

ing the noisome air which surrounds our habitation all the more vexatious and insupportable. The afternoon sun casts its rays upon the mountain, causing it to appear quite near, while its topmost peaks, no longer cloud-capped, tower above the cloud rifts which have settled below, looking as if Halla-San was a grand highway to heaven itself. There is but little wonder, I said to myself, that these simple people should invest the great mountain with special sanctity. That these clouds are but vapor arising from the thermal sources in the mountain there is every reason to conclude, for I had noted the peculiar character and color of the clouds, which maintained a certain uniformity until the noon of each day, when the vapor ascended and left the summit bare for the rest of the day.

I was told that in the mountain there were three large lakes named, respectively, Pang Mok Tam, Tong-Chang-UI, and Su-Chang-UI.

The courtyard of my house in Chu-Song was crowded from morning until night with the people who struggled for place to get a sight of me. I tried in vain to secure some seclusion, and failing in this I turned the assemblage to account by endeavoring to secure some of the traditions of the people. With this in view, I engaged the master of ceremonies in conversation, adroitly provoking him to speak rather than to question, which would have effectually thwarted my object. Finally I brought him to the point. He said: "Halla-San is the home of a great spirit. No one can ascend to the top of the mountain, it is the home of a fairy goddess, and no one can see the face of the goddess and live. Our Governor for this reason, as well that the people would have been



angered, would not let you go. Halla-San," the old man continued, "is the beginning of the world; it was there man was first created. Yes," he said, "one day there came up out of the mountain three men, *Yang-ul-la*, *Ko-ul-la* and *Po-ul-la*, and stood each in the presence of the other; when they had recovered from their surprise they descended to the sea-shore, when lo! there appeared in the distance borne swiftly upon the waves a huge box which was thrown upon the sand at their feet. Yang, Ko and Po opened the lid when there jumped out *three* beautiful ladies. Of course they married them. They then returned to their mountain home, and there they found every sort of grain, fruits, fowls and animals. *Chae-Ju* was thus created, and after *Chae-Ju*, the world." "What about *Tanlo-Gook*? (Kingdom of Tanlo)" I asked, anxious to discover if the ancient Mongol name had found a place in their traditions. To my surprise and delight, Mr. Shim replied: "*Chae-Ju* was once called *Tamna-Gook*, and at that time, many hundreds of years ago, was governed by a beautiful queen, who, besides being possessed of great strength, was also a great warrior. The king of Corea became very jealous of this queen, and sent his warrior, *Chae Chung Goon*, at the head of 300,000 men to subdue and capture her. The queen was able to defy the *Goon* until one day, having made sacrifices to Halla-San, the *Goon* was inspired to set fire to the trees and woods with which the island was covered, and the queen was killed, after which the *Goon*, when he saw the lifeless body of the queen, killed himself. From that day *Tamna-Gook* has been called *Chae-Ju*."



*Tamna-Gook*, it is evident by its similarity, is only another term for *Tanlo-Gook*.

"Did you ever hear of Hamel?" I asked, telling him the story as Hamel has described it. Shim shook his head dubiously and maintained that no white man had ever been in Chae-Ju. I insisted, however, that there had been, and that Hamel had been kept fourteen years a prisoner in Corea and had finally escaped. That it was 235 years ago, and one object of my visit was to discover some evidence of his sojourn in the island. I asked again if there had not been at some time a colony of Europeans in Quelpaert (referring to the Portuguese, reported to have had at one time a settlement in Chae-Ju). To all these queries I received an emphatic negative, and, lest I should be considered as quite demented, I insisted no longer.

The *séance* was broken up by the arrival of messengers accompanied by guards. These latter fell upon the crowd and drove them out of the inclosure, after which servants came forward bearing eggs, chickens, and other presents from the Governor. When the repast was concluded I requested Mr. Shim to clear the people out, for they had filed in again as soon as the soldiers had gone and filled every available space. Finally I was left to myself. Kim was ill with a fever and Chung was asleep. Opening wide the door and lighting a cigar, I threw myself upon my blankets and in a little while, overcome by fatigue, slept, disturbed again and again during the night by the violent ringing of the city bell to frighten away the evil dragons, or by the incessant raids made by an army of rats upon the debris of our unconsumed repast.

*1st October.*—At nine o'clock in the morning the Governor's guards came. Mr. Shim said he had been instructed to clear the streets, and preceded by the soldiers we sallied forth, passing rapidly to the southwest gate, thence to the east gate, and, finally, stopping occasionally to photograph with my camera a type of the people or a view of the city, we reached the south gate by which we had entered Chu-Song. By this time, notwithstanding the orders of the Governor and the vigorous blows inflicted by the *conjangs*, the streets became impassable by reason of the crowd. In vain the paddle men cried "*Naogimara*," get in your house! Having accomplished at length the real object of my *sortie* I gave the order to return to the house, where, having had *tiffin* (breakfast) at noon, I prepared to obey the summons of the Governor, to whom I had already announced that I would pay him my visit of adieu, since I hoped to return to Peldo that same day. The simple thought of another night in our abode gave me a spasm of horror, as it did both Kim and Chung; but their spasms were not exactly those of the olfactories, for their nerves generally had become a little unsettled by the unusual strain to which they had been subjected. Arrived at the Governor's residence I found him surrounded by his friends and eunuchs, a fact which will give some idea of the pretensions of this *Chae-Ju* governor, who was receiving with all the *rigueur* of a crowned head. It was not impolitic, however, for he had already informed me that the people were wild and ungovernable and that he feared them. A display of much authority, therefore, was necessary to keep them in check.

Through the lattice doors, in the rear of the room in which I was received, I could plainly see the forms of a number of females, who, I remarked, were much more robust and better developed than those seen in Seoul. As a matter of fact, they are far from good looking, their principal excellence consisting in a wealth of black coarse hair. The white eunuchs, on the other hand, are much better looking than the tall, lantern-jawed looking specimens of the black and neuter gender, which I had been accustomed to look upon in Egypt, but the Korean eunuch does not enjoy the full confidence or social status which is the privilege of the Egyptian eunuch, doubtless because his fidelity is not above suspicion, and because his neutralization is not so complete as that of the black. The Governor's eunuchs are a fat, feminine looking class, and apparently, quite happy and most vain of their gaudy robes.\* It is said their lot is a subject of much envy and of jealous aspiration (?) among the lower classes. Several hours were spent in pleasant conversation with the Governor, whose embarrassment of the day before was replaced by a genuine cordiality, induced, without a doubt, by the prospect of my early departure. The inevitable *chow* was introduced, but having taken the precaution to breakfast, I begged to be excused. I then proceeded to photograph the Governor, who had donned his official dress for the occasion. When I had finished he desired very much to have a look at the picture, and could not be made to understand my refusal. On taking leave, the Governor caused a quantity of oranges, limes and *chun bocs* to be brought and presented to me,

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\* The Korean eunuch is always a married man.

as a souvenir of my visit. Quitting him, I returned with Kim to the house, where crowds were waiting to catch a glimpse of the foreigner.

At 4.30 P. M. the ponies provided by the Governor arrived. One word with reference to these animals, stories about which have done much to make Corea almost as marvellous as the land of Lilliput. For a fact the Chae-Ju pony is small, but I was told that the diminutive breed was only to be found in the adjacent island. When the luggage had been strapped upon the backs of coolies, we mounted our ponies and the escort preceding with music, banners and flags, we left the city by the east gate, to which point we were followed by a vast and ever curious throng which finally left us to make their way back to their homes, there to speculate and muse upon the stranger's apparition among them, and to weave no doubt another web in the maze of curious legends of a people, unnumbered and unknown as yet in the great world of which they are only nominally a part.

The march to Peldo was accomplished without incident. The road, unlike the one by which we had been led to the capital, was smooth and easy. The golden rays of the declining sun swept over the sea on our left and across our path, and rested on the sides of Halla San, where already the shadows of evening were gathering, rendering the scene one of peculiar beauty and grandeur.

As we entered Peldo we were again obliged to run the gauntlet of the curious throng, but the officer in charge cleared the way with his escort and with the aid of the inevitable *conjangs* we were soon arrived at our boat, where we were received with manifestations of joy by our imprisoned Japs, who were greatly disturbed by the

strict surveillance under which they had been kept by the authorities and the people. Bidding our escort adieu we went on board of the little *Bravo Maru*, happy to have successfully accomplished our proposed visit and glad indeed to exchange the poisoned atmosphere, which had in fact compelled our retreat from Chu-Song, for the pure air of the sea.

*2d October.*—The Prefect of Police came to see me the following morning and from his insinuating manner and hints I soon discovered that his visit was a begging one. I told Kim to give him some slight presents but nothing of value, unless we were allowed to camp on shore. The man asked for my blankets, and showed his ill humor when told point blank that he could not have them. The Prefect wanted medicine and he was given a quantity of quinine, cathartic pills, castor oil, and went away well pleased. When the people on shore discovered that I was a “medicine man,” I was besieged by applicants who desired to be treated. My pharmacy was small and was soon exhausted, when I was obliged to have recourse to primitive remedies. For example, I treated their sore eyes with salt water, to which color and aroma were imparted by a few drops of mixture, *Eau Dentifrice*, which I took from my toilet bag.\*

My limited pharmacy did not permit me to test fully the efficacy of my remedy whilst in Chae-Ju. Since

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\* I learned subsequently that my visit to Quelpaert has inspired the Missionaries with the idea that they may obtain a footing there, should they undertake to do so, I seriously recommend them to adopt the rôle of medicine men. The savage, whether Indian, African or Mongol, holds medicine in inexplicable awe. A bottle of croton or castor oil I have found in my travels to be a more potent “open sesame” to the savage heart than the finest elephant gun, if you are only given time to present these credentials.



our return from the capital we were again placed under surveillance and obliged to remain on our boat, from which during the day I succeeded in taking a number of views with my camera, attracting the attention of the people, curious to know the meaning of my looking into an instrument which they were told was to measure the height of Halla-San. When it seemed certain that the authorities would not permit me again to land, I resolved to return to Corea, and announced my intention to the captain and crew, who were very much elated thereat.

The pilot Yang Man Tuk had remained with us and it now became a question of what to do with him, for he had been threatened with violence by the people, who were angered that he should have brought us to the island. I proposed to land him some distance down the coast in order that he might avoid the residents of Peldo and reach his home, which he said was near the eastern end of the island. He claimed, however, that he could run the gauntlet of the town at night. Accordingly, Kim gave him a good round sum in small copper cash, which here as in Fusan and along the coast constitutes the currency, 650 being equal to one yen or Mexican dollar. Tuk was overcome by his unexpected good fortune; he wound the cash, which is strung upon cords though the hole in the centre, around his body, and after repeated bows and expressions of thanks he vanished in the darkness of the night and we saw him no more.

#### VI.—THE RETURN.

*3d October.*—At 3 A. M. of the 3d of October the captain awakened me to announce that the wind had



changed to the southeast and was blowing steadily from that quarter. "Let her go, captain," I replied, and in the bright moonlight we moved silently out of the port with not even the bark of the ever watchful dogs to signal our departure. Favored by a good steady breeze the little *Bravo Maru* sped swiftly on her homeward course, and at sunset without accident we had gained the lee of the Soando group, where we could breathe freely, for the real dangers of the journey were now practically passed.

*5th October.*—On the 5th we ran into the harbor of *Majæ Mok* for fresh water.

*6th October.*—On the 6th we made To-Yong. To-Yong is the queen city of the Inland Sea of Corea, situated within a gorge of high hills and protected from the sea. The approach is through a beautiful bay, a good harbor of itself. The situation is delightful and well adapted with a fine shore to constitute a summer resort for good sea bathing. To-Yong, it is easy to see, will add materially to the revenue of Corea when it shall become an open port.

To-Yong possesses a number of well built Yamens and is the official residence of a mandarin. Whilst Chung was engaged in preparing tiffin, I went on shore with my camera and proceeded to photograph the harbor and city. Whilst I was at work, Kim made his way into the town to purchase an article of toilet without which a Corean does not exist—with dignity. Kim's hat had been smashed, and he was in such a state of mind that I was only too glad that an opportunity presented itself to purchase him a new one. Kim came back with his prize, but was very much flurried and said that the mandarin

had ordered him out of the town, and had also told him to say to the foreigner "that he must not come to To-Yong, that women were allowed to go about the streets, and he did not care to have them looked over by a foreigner." The audacity of the message angered me at first, but I laughed heartily a moment after, as I said: "Send back word to the mandarin, Kimmy, that he need have no fear for his old women, he can keep them and be hanged to him." But Kim would no more have sent my message than he would have hanged himself. Having secured a picture, I returned to the boat, first taking a delightful bath in the sea, and having breakfasted we set sail and were soon slipping along with a stiff fair wind.

The shore from this point is a succession of picturesque villages. On the flats may be seen great numbers of women, girls and boys, fishing for *nakgi*, a kind of devil-fish, greatly prized by the Coreans.

The wind died out with the sun, but my sailors, anxious to reach their homes, now stripped themselves of their clothing and taking the oars plied them vigorously during the entire night.

*7th October.*—The breeze came up with the morning sun and, making sail, we arrived at Fusan at noon.

Five hundred miles in a *sampan* under the conditions here recited, in the face not only of the ordinary dangers of the sea, but the always to be dreaded typhoon—a breath of which would have sufficed to have blown us into eternity—cannot be regarded as a pleasure promenade. When to this is added the successful visit and reception accorded us in the ever mysterious island of Quelpaert, the reader may understand the enthusi-

asm with which the *Bravo Maru* was received on our arrival by the brave and simple fishermen, who were not without a certain interest in the result, for it opened the door perhaps for them to fish and barter in the future.

At Fusan my journey had commenced, and returned, it ended there, so far as the *Bravo Maru* and crew were concerned. The Japs were paid off at once and with many genuflexions and *Siyinarahs à la Japonaise* they left me, to hie quickly to their families, whilst followed by Kim and Chung I sought my hotel, where I proposed to remain several days to await the arrival of the incoming steamers.

Fusan, in lat.  $35^{\circ} 6'$  and long.  $129^{\circ} 1'$  east of Greenwich, constituted as late as 1868 a fief of Tshushima, when it was added to Corea by Japan. The treaty of 1876 opened it to trade. It is in color, construction and population a Japanese settlement, and numbers 3,000 souls. The native Corean town is three miles distant at the head of the bay, but it is a mere collection of rude thatched huts. The port of Fusan is the most important in Corea and maintains a large export trade in cereals, beans, peas, hides, bones, sea-weed, fish, shark fins, *chunbo* and *chunbo* shells, grass cloth, etc.

The climate is mild and dry, and the place is the most or, rather, the only delightful place in Corea. Fusan is consecrated ground, and offers some inducements to the traveller student of history. It was here that the armies of the Tycoon, under the famous generals Konishi and Kato, landed on the 25th day of May, 1592, and on the same day invested and took the

celebrated castle of Tong-Nai, twelve miles distant, which still contains in its ruins some evidence of the invasion.

Twenty miles from Fusan on the sea is *Ulsan* where five years later the victorious army, besieged by the allied Chinese and Corean armies, resisted during an entire year, having given proofs of a heroism and valor which has made the Japanese name a terror to the Coreans.

On the 17th of October, having sent my attendants back to Seoul by the steamer bound to Chemulpo, I took passage on the steamer *Takachiho Maru* to Guensan, on the east coast of Corea in the Sea of Japan, and thence to Vladivostock in Eastern Siberia.

Siberia! At the very name a chill *tremor* runs through one's body, not only of cold, but because of its ill fame as the land of the exile. The island of *Saghalin* lies north of Vladivostock, and is one of the principal depots for the detention of exiles.

It is somewhat difficult to understand the transition to Siberia, for in imagination the way leads over barren steppes and by means of sleds drawn by reindeer over frozen snow. To have reached it so suddenly and by a short cut in an ocean steamer causes a lingering surprise, despite the chart on which I carefully noted the route.

Vladivostock is the prospective terminus of the Trans-Siberian Railway. Along the proposed route there is a post road and telegraph already, by which one may send a letter to Europe or America for five cents, or a telegram for five cents per word. The town is purely a garrison, Russia having constituted it a military and naval station. The civil population numbers

perhaps ten thousand, the Cossack soldiers and marines being an unknown quantity, although I was told that on an emergency Russia can mobilize twenty thousand Cossacks at this point.

During my stay in Vladivostock, I remained on the steamer in default of finding a decent hotel on shore. I was the only passenger, and with the genial Welshman, Captain Walker, I would not in fact have exchanged my quarters had there been a "Grand Hotel" in the town.

On the 26th of October the steamer left for Guensan. I was not sorry to quit Vladivostock. The place was gloomy and cold, it had all the chill which imagination had given it in advance, in fact, it was Siberia—as I had seen it in my mind's eye, and four days of Vladivostock with its skies and frigid temperature gave me more than enough of the place. At Guensan I was hospitably entertained by Mr. C——, the Collector of the Royal Corean Customs, and by Mr. B——, his deputy. On the 29th, having bid adieu to these gentlemen, and to Captain Walker, to whom I was indebted for his genial and sympathetic companionship, I set out to return to Seoul overland, a distance of one hundred and eighty miles. For this purpose I was provided with two pack ponies, one for my baggage and the other as a mount. The driver was a surly Corean, and the journey promised to be a lonely one, and so in fact it proved, not to mention the enforced close contact with coolies, fleas, and vermin of all sorts which swarmed in the foul and overheated kennels called *cahns*, the *inns* in which I was compelled to stop at night, which form the delight of the Corean.



A pleasant exception to this ordeal was the night of the first day's march, which I spent in the beautiful and romantic spot at the celebrated Buddhist monastery of Ampien, twenty-six miles from Guensan, where I was hospitably entertained by the jovial bonzes and by the venerable High Priest, Mr. "Suit-Ho," or "Snowy River," to whom I had a special letter of recommendation from Mr. Wo, the Chinese Consul at Guensan. For the rest my way lay along rough roads, over steep mountains, and now and then through the placer gold diggings, a few of which were being worked, though in a most primitive manner.

On the second day I passed on my left a mountain from which a dense column of vapor ascended, and gathered from my guide that it emanated from boiling springs. On the following morning, having climbed a very steep mountain, I discovered in the descent, and flowing from the mountain side, a source which I followed for several hours, when it widened into a bold, rapid stream, one of the principal sources of the Han River, now visited for the first time by a white man.

On the 4th November, at noon, I arrived in Seoul, having accomplished the distance across Corea of 180 miles in the short space of six and one-half marching days, and chiefly on foot, for my pony had gone lame on the second day's march from Guensan.

His Majesty, Li, King of Corea, when informed of my return, requested me to meet him in a private audience, and accordingly, on the 10th November, I was received at the palace where, surrounded by his eunuchs and mandarin councillors, the king listened with eager attention to the account of my adventures in Chae-Ju,



and when I had finished he questioned me closely as to the proper measures to be adopted to protect the island in a military sense.\* In this connection I should add that His Majesty, on two occasions since my residence in Seoul, had proffered me the command in chief of the Korean army, but I had respectfully declined that honor, chiefly because I believed it to be *infra dig.* whilst holding office under the United States Government to accept office under a semi-barbarous government, to say nothing of the poor results which such service attained as a rule, by reason of the jealousies and animosities provoked on the part of the native element. It was, however, my proud privilege, in recounting to the King of Corea the substance of the foregoing expedition, to add a page to the unwritten history of an island and people almost unknown to the sovereign himself, and terminate thus with this pleasant episode my journey from Corea to Quelpaert in the footprints of Kublai Khan.

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\* Subsequently, and when I had resigned my post, I was accorded a lengthy and pleasant interview with the Secretary of State, who among other things desired to learn my opinion in regard to the concessions to be obtained from Oriental governments and which seemed to be the objective of many of our representatives to those governments. Some of them, as the Secretary well knew, were even then using their official position to secure for themselves lucrative offices under the governments to which they were accredited. Reply having been made that such action was discreditable to the United States Government, and should be made a subject of rigid action on the part of the Department, the Secretary related a case apropos to the matter where a gentleman, a United States Minister returning from his post, stopped in London and went to see Lord Salisbury, and after reciting at great length the sum of what he had succeeded in obtaining, Lord Salisbury exclaimed: "Well, Mr. Minister, I hope you have left the air in that country." It is to be assumed that the rebuke was not lost upon our countryman.

## VOLCANIC ERUPTION IN THE BERING SEA.

By permission of Professor Mendenhall, Superintendent U. S. Coast and Geodetic Survey, Professor Davidson furnishes the following information concerning the uprising of volcanic islets in the Bering Sea.

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### THE RECENT VOLCANIC ERUPTION OF BÓGOSLOV.

The volcanic islet St. John Bógoslov, or "Old Bógoslov," lies in the southern part of the Bering Sea, thirty-seven nautical miles west by north from the north-western point of Unaláska Island, and twenty-nine miles north-north-west from the northern point of Umnak Island. Its geographical position is latitude  $53^{\circ} 57'$ , and longitude  $168^{\circ} 00'$  west. It is therefore forty-four miles west from the living volcano of Makúshin, which is 5,691 feet above the sea. It has been frequently seen in eruption since Cook passed it on the 29th of October, 1778, at a distance of eleven miles to the south-east. At that time Old Bógoslov had the Ship Rock lying a short distance to the north-west, and doubtless connected with it.

Between 1823 and 1888 there were no signs of eruption reported, when a new and much larger islet was raised, with an exhibition of flames, smoke, steam and ashes from the deep water to a height, then estimated from 800 to 1,200 feet, but which has settled down to about 700 feet.

It may however be of interest to refer chronologically to this and the immediately adjacent volcanoes in bring-

ing up the history of Bógoslov, from Greywink, Weniaminoff, Tebenkof and others :

- 1768. Volcano Makúshin on Unaláska Island and the other volcanoes active. Bógoslov seen by Levasheff.
- 1778. Bógoslov seen by Cook, showed no signs of activity.
- 1790. Volcano Akután on Akután Island, 3,888 feet high, and distant 76 miles E. by N. from Old Bógoslov, smoking; Makúshin in activity at intervals to 1792.
- 1796. Old Bógoslov reported to have risen from the sea: probably great changes took place that year.
- 1800. Old Bógoslov was increasing in size from this date to 1815.
- 1802. Makúshin in eruption, vomiting forth great fires; earthquakes: Bógoslov smoking, hot geysers.
- 1826. Makúshin smoking; two heavy earthquakes in June.
- 1830. Volcanic eruption at the south-west end of Umnak Island in August.
- 1838. Makúshin and Akután smoking.
- 1844. Makúshin smoking feebly.
- 1852. Volcanic eruption on the north-west side of Akután. (Archimandritoff.)
- 1867. Makúshin and Akután and Shisháldin smoking. Earthquake at Iliuliúk in March; great cracks in the earth visible in September; Davidson's party made first ascent of Makúshin and determined elevation.

1883. Old Bógoslov quiet, but the New Bógoslov, five or six times the area and much higher, rose to the north-west of Ship Rock and connected therewith. (Captains Hague and Anderson of Alaska Commercial Company to Davidson.)
1884. The New Bógoslov is covered with steam jets, and is connected with Ship Rock and old Bógoslov with gravel isthmus. The Ship Rock nearer the New Bógoslov. The New Bógoslov is about 700 feet above the sea, and can be ascended but a short distance in one or two places. (Captain Healy, and Lieut. Doty, U. S. Revenue Marine to Davidson.)\*
1888. Since 1884 the Captains of the Alaska Commercial Company have repeatedly reported to Davidson that the New Bógoslov has been decreasing in height. It has been repeatedly photographed, particularly by officers of the U. S. Revenue Marine, and by Captain Nichols, U. S. N., on Coast Survey duty. Captain Nichols ascended some distance in 1888, when it was still hot and smoking, and the whole surface crumbling to ashes and falling away. He measured the height, nearly 700 feet.

This was the condition of the volcanic islets until the 10th of February, 1890, when a sudden eruption took place, and the great light and clouds of pumice ashes filled the sky. The 17th and the 22d were also marked by great activity; and *from the Village of Iliuliúk the*

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\*For views, charts and description, see Appalachia No. 1., Vol. IV., ; Science Vol. III., p. 282.

*flames were seen over the crest line of Makúshin* : and angles of elevation were measured by Mr. Applegate to determine the height of the volumes of smoke and ashes. Iliuliúk is twelve nautical miles east of Makúshin, so that this volcano lies directly in the line between the village and Bógoslov. If we assume that the flames seen over Makúshin were the highest exhibit of the eruption, their elevation would be about five miles ; the measurements further indicated that the ashes and clouds of steam rose to an elevation of over fourteen miles.

Mr. Neumann, the Agent of the Alaska Commercial Company at Iliuliúk, Unaláska, writes to the Company, as follows:

"The past winter has been mild. Bógoslov has been very active during the winter. On February 10th, 17th and 22d ashes were blown to this place, of which I forward sample. On the last mentioned date a column of smoke was observed here, estimated to be 15 miles high. The old island is reported to have been raised considerably, and new land has risen from the sea." Captain Erskine brought a bottle of these ashes to Davidson. He was at Tchernikoff Bay, and reports:

"The Old Bógoslov lies 40 miles N. 35° W. from the mouth of the bay, which is situated on the north side of Unaláska Island, 11 miles from its southwestern extremity and 8 miles from the eastern face of Umnak Island. The natives formerly could see the Old Bógoslov, and the New, on rare occasions, when the weather was very clear ; now they see the mass very plainly under similar circumstances. This would indicate the new islets as being over 1,000 feet high. They report that there are

three new islets formed by this last eruption, and that they are close to, but not connected with, the Old Bógoslov."

The Aleuts have been terrified at all their villages on Unaláska, and they recall the traditions which relate much suffering to have occurred to them after great convulsions and earthquakes among the Islands. In the present case they report that the great flames shot high into the sky, and that great masses of burning matter were thrown outwards from on high and fell into the ocean, whence columns of steam arose.

Captain Everett Smith was cod-fishing in the steam whaler *Balena* to the northward of Cape Cheerful, Unaláska Island, and saw the eruption, which he is reported to describe as resembling a great city on fire; but it is not known whether he saw the first outbreak. The Pacific Whaling Company has no letter from him, but he is reported as saying that there are four new islets detached, but near the former Bógoslovs.

Captain Erskine reports that all the snow covered mountains of Umnak, Unaláska and Akután were so thickly covered with ashes that they were lead colored. These ashes did not reach eastward and northward to the tidal station of the United States Coast and Geodetic Survey at St. Paul, Kadiak Island; nor was any unusual phenomenon noted there. On the contrary, the month was a remarkably pleasant one. The ashes collected at Iliuliúk have, according to Davidson, a fair percentage of magnetic oxide of iron, as might be expected.

It should be noted that these new islets must have risen from profound depths. South of the old Bógoslov



there are depths given over 800 fathoms; and about twelve miles away to the north and west there are depths reaching 1,200 fathoms, or more than one and one-third miles.

It is understood that the eruption had somewhat subsided, when the news was sent from Iliuliúk in the latter part of April.

GEORGE DAVIDSON.

SAN FRANCISCO, June 2, 1890.

## GEOGRAPHICAL NOTES.

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VERRAZANO'S VOYAGE.—Prof. Karl Lechner has told the story of Verrazano in Nos. 8, 9 and 10 of *Globus*, for 1890. He traces the history of the Verrazano family back to the 13th century, when it was already solidly established in the lordship of Verrazano, a few miles to the south of Florence.

Not much is known of the discoverer's life. A chronicle of doubtful authority mentions him as settled in Dieppe in 1508. It is certain that he was in the service of Francis I. in 1521, when he captured a Spanish ship with a precious cargo; and that in 1523 he attacked, near Cape St. Vincent, and took two of the three caravels, in which Cortés had sent the treasure of Montezuma to the Emperor Charles V.

This incident, unrecorded by Peter Martyr and Herrera, is told by Alonso de Avila, who was captured in the fight with Verrazano, in a letter written on the 17th of June, 1523, from his prison in La Rochelle to the Emperor. Other documents of the time show that Verrazano's fleet at first consisted of four vessels, with which he was to make his discoveries for the King, "towards China." Two of the ships were lost in a great storm in the "northern part of the Atlantic Ocean," and the others put back in a damaged condition to the coast of Brittany.

The capture of the Spanish caravels was an episode,

and the original enterprise was resumed, but only with one vessel, the *Dauphine*, which left France, it is supposed, in December, 1523, though it is only known that on the 17th of January, 1524, Verrazano set sail with a crew of 50 men from the neighborhood of Madeira.

Dr. Lechner leaves the voyage at this point, in order to follow the subsequent career of the navigator. His report to the King is dated the 8th of July, 1524. Francis was expected at Lyons on the 4th of August, and Verrazano's countryman, Carli, who was then living in that city, wrote on that day to his father at Florence, enclosing Verrazano's report, with the remark that the discoverer would soon arrive in Lyons, and that it was hoped the King would furnish him with a half-dozen ships for another and more considerable voyage.

Verrazano must have reached Lyons about August 4, and by sea, for Peter Martyr writes from Valladolid, on the 3d of August, that a "courier of the Portuguese King's has arrived with the news that a vessel from the Indies, with a cargo worth 180,000 ducats, has been captured by Verrazano."

Nothing came of the plan for a new voyage, the King's attention being absorbed by the struggle with the Emperor, which ended for a time with the battle of Pavia and the captivity of Francis. Verrazano next applied to Henry VIII., but without success.

An undated document, brought to light by Margry,\* records an agreement between Philippe de Chabot,† "Admiral de France et de Bretagne," Jehan Ango, Guillaume Preudhomme, "général de Normandie,"

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\*"Navigations Françaises," p. 194.

†Dr. Lechner makes this historical name unrecognizable by writing it *Cabot*.

Pierre Despinolles, Jacques Boursier, and "messire Jehan de Varesam" (Verrazano), for an expedition to the Indies, to be commanded by Varesam. This document cannot be dated earlier than 1526, in which year Philippe de Chabot was made Admiral.

Mr. Henry Harrisse has found in the archives of the Parlement at Rouen two papers executed by Verrazano, the one on the 11th, the other on the 12th, of May, 1526; both relating to the projected Indian voyage, of which nothing more is known. In October, 1527, a dispatch informed the Emperor that Verrazano had been captured, with his ship's crew of 130 men, by a Biscayan squadron.

This may have been on the return from the Indian expedition. Verrazano offered 130,000 ducats as a ransom, and the Portuguese bid large sums for his delivery to them. The offers were rejected, and the Biscayans took their prisoner to Cadiz, where they received an order to send him to Madrid. On the way he made a fruitless effort to escape. A second order from Charles doomed him to death, and he was hanged on the 13th of October, 1527.

Dr. Lechner takes the details of Verrazano's voyage to the west from the text of Ramusio. Setting sail on the 17th of January, 1524, the voyager sighted land on the 10th of March, in  $34^{\circ}$  N. Lat. This is nearly the latitude of Cape Fear, on the coast of North Carolina. Verrazano sailed about 50 leagues\* to the south, searching in vain for a good harbor, and then put about to the north. His first landing was made at a place covered with fine sand, and rising inland in little hills.

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\* These leagues are variously estimated at 15, 18.75 and 20 to the degree.

Still farther up the coast he found the shore cut up by a number of little streams and arms of the sea, and beyond this point were wide plains and broad stretches of forest. This is a fair description of the coast between Onslow Bay and Cape Lookout, and the first landing was probably at New River Inlet. Following the coast, which turned more to the east, Verrazano sent men ashore for water. This must have been a little to the south of Cape Hatteras. After sailing 50 leagues farther, the land now trending to the north, Verrazano cast anchor and lay for three days at a place where he saw many canoes made of single logs, 20 feet in length and 4 feet broad, and hollowed out by fire, without the help of iron or stone; and in all the 200 leagues of his coasting he had not seen a stone. This anchorage ground Dr. Lechner places at about 38° N. Lat. Sailing now by day, in a northeasterly direction, and anchoring by night, Verrazano came in another 100 leagues to the mouth of a very great river, flowing out between small steep hills, and affording an entrance fit for the largest ships; and he ascended this river for about six leagues. Every point in his description of the entrance, and the river, and the "most beautiful bay" (lago), applies to New York. He continued along the coast, now lying east and west, for about 50 leagues, and came to a triangular island, 10 leagues from the mainland, and in size like the island of Rhodes. To this island he gave the name of *Luisa*, in honor of the king's mother. This, the only instance of a name bestowed by Verrazano, was changed by the cartographers to Claudia, the name of the first wife of Francis. Dr. Lechner identifies *Luisa* with Block Island for the rea-

son that this agrees with the distances reported in Verrazano's letter, and also with the position assigned to *Luisa* on Girolamo Verrazano's chart, where it lies to the south-west of Narragansett Bay, described by the navigator as an admirable harbor, half a league wide, where it opens to the south, and expanding within to a bay of 20 leagues in circuit, and inclosing five islands. The latitude he gave it was that of Rome ( $41^{\circ} 40'$ , as then understood), and this agrees well enough with the latitude of Newport ( $41^{\circ} 29'$ ); and local conditions, he found, made the climate colder than that of Rome.

All the evidence from the letter of Verrazano and the chart and the physical facts is in favor of this, rather than of Kohl's identification of Luisa Island with Martha's Vineyard.

Fifteen days were spent at Narragansett Bay, and the voyage was resumed on the 5th of May, and continued, always within sight of the coast. For 50 leagues the direction was to the east, and then for 100 leagues to the north. This brought the ship to Cape Cod, and Verrazano found to the north a high land covered with pines, cypresses, and other trees peculiar to northern countries. The natives previously seen were friendly, but in this place they kept aloof.

The trend of the coast from this point was to the north-east, and the voyagers came to a fair, open country, with high mountains in the interior, and kept on their course for another 50 leagues along what must be recognized as the coast of New Hampshire and Maine. Verrazano counted 32 small islands near the land, with fine harbors and channels that reminded him of those in Slavonia and Dalmatia. Sailing still to the north-



east for 150 leagues more, Verrazano came to a country discovered, as he writes, in past time by the Bretons. This was in Lat. 50°, and, therefore, on the north-eastern coast of Newfoundland; and here the voyage of discovery ended. So, at least, Dr. Lechner is inclined to believe.

Verrazano's letter does not mention his brother Girolamo, and the latter dates his chart only by a reference in the description of the land discovered by Giovanni: "Verrazana, or New Gaul, which Giovanni da Verrazano, of Florence, discovered five years ago by order and command of the most Christian King of France." \*

Dr. Lechner takes up and combats with vigor the charge of falsification, first brought against Verrazano by Buckingham Smith, and afterwards urged "more keenly and with much greater unfairness," † by Henry C. Murphy.

Murphy's arguments are chiefly of a negative character. De Costa has shown that Verrazano was not the only navigator who failed to discover the Chesapeake and Delaware bays. He makes no mention of wampum or of tobacco, but neither does Ribault (1562), nor Ingram (1568), nor Barlow (1585), nor Pring (1603), nor Popham (1607), know these words. Verrazano, nevertheless, describes "a broad chain, ornamented with many stones of different colors," ‡ worn around his neck by the old king of the natives, in the

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\* Verrazana sive nova gallia quale discopri 5 anni fa giovanni da verrazano fiorentino per ordine et Commandamento del Cristianissimo Re di Francia.

† Some of Dr. Lechner's expressions would have been softened, had he known that Mr. Murphy was no longer among the living.

‡ una catena larga ornata di molte pietre di diversi colori.

neighborhood of Newport; and this chain must have been a wampum collar.

It is well known that Murphy regarded the Verrazano text, given by Ramusio, as falsified, and maintained that the other, which is called the Magliabecchian, was the original, or, at least, a more trustworthy copy of the original.

Dr. Lechner shows, by a comparison of expressions and passages in the two, that the text of Ramusio is in every way to be preferred, as regards both language and sense, to the Magliabecchian. The latter is evidently the work of a writer very little acquainted with the Italian language, and the sixty examples quoted from it by Dr. Lechner are nearly always unidiomatic, and very many of them are Latin and French words and forms.\* Frequently the writer did not understand the text he was copying, as in this instance:†

\* A few instances will suffice :

RAMUSIO.

scoglio.  
a prima vista.  
perchè  
ricchezze.  
fortuna aspra.  
ad arrivare.  
con poca pioggia.  
fastidioso.  
per condurlo in francia.  
grandissima fiumara.  
ponente.  
tramontana.  
mare.  
fuocho.  
Lombardia.

MAGLIABECCHIAN.

scopulo.  
al principio.  
che.  
divitie.  
turmenta.  
a posare.  
con rara pluvia.  
infesto.  
menare in francia.  
grandissima rivera.  
zeffiro.  
settentrione, aquilone.  
pelago.  
quarto elemento.  
Cisalpina Gallia.

† una cintura d'herba stretta et ben  
tessuta, et con varie code d'altri  
animali adornata.

una cintura d'erbe tessute con  
code di altri animali.

"(The inhabitants wear) a girdle of grass, narrow and well woven, and adorned with various tails of other animals." This passage is rendered in the Magliabecchian: "A girdle of grasses woven with tails of other animals."

In Ramusio, Verrazano turns homeward, having discovered "seven hundred (DCC) leagues and more of new country." This appears in the Magliabecchian as five hundred and two (DII) leagues. Where in another place Ramusio reads 500, the other text has 800. In Ramusio a storm occurs on the 20th of February, which becomes the 24th in the other text. The natives of the new country are described in Ramusio as "red in color and not very unlike the Saracens."\* The Magliabecchian makes them "black in color, not unlike the Ethiopians." Verrazano found in one place in the spring time some grapes, the dried fruit of which was sweet to the taste; but the word *secco* (dried), which makes the statement plain in Ramusio, is omitted in the Magliabecchian, and this has supplied an argument to Mr. Murphy.

His strongest reliance is, however, upon Verrazano's supposed obligation to the cartographers, whose work he appropriated. Chief among these is Diego Ribero, who derived his information from the Portuguese Estevão Gomez. "How does it happen, then," asks Dr. Lechner, "that where Ribero marks on his chart the Bay of Santa Maria and San Christoval,† Verrazano found nothing? The coast was the same to both explor-

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\* Sono di color berrettini et non molto dalli Saracini differenti.

† This is the Spanish form given by Ribero. Dr. Lechner writes it in Italian, *Christoforo*. Why not in Greek?

ers. Where Verrazano hopes to find gold, Ribero declares that there is none; and Verrazano's  $41^{\circ} 40'$  is in Ribero  $44^{\circ}$  N. Lat."

Mr. Murphy affirms that Verrazano and Ribero commit the same mistakes in estimating the distances from New York to Cape Cod and thence to Cape Sable; but the name of Cape Cod does not appear on either map, for the reason that it was not known till Gosnold's voyage in 1602. Murphy assumes that Cape Cod is Ribero's "Cabo de muchas islas," but this designation in Ribero agrees with the Rio de las Gamas, of Cespedes, and Murphy, in another place, identifies this with the Penobscot.

Ribero must be right, according to Murphy, because he follows Estevão Gomez; but what is the authority of Gomez? The contemporary Spanish writers give only the briefest notices of him, and mention neither the northern nor the southern limit of his voyage, nor any gulfs or harbors or sounds that he discovered. Kohl says on this subject: "In respect to all the particulars of his voyage we are left to probabilities."\*

Verrazano must have been aware, says Mr. Murphy, that when he reached  $50^{\circ}$  N. Lat. he was on a coast already known to the Bretons, for he himself had been there with Aubert in 1508. It cannot be said that he made a mistake as to the coast, for he came with his people from Dieppe, and must have recognized regions frequented by Norman and Breton and Portuguese fishermen. The answer is, in the first place, that Verrazano uses the word *scoprire*, as English seamen of the time used the word *discover*, in the sense of *to sight*, *to*

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\* Kunstmann, Entdeckung Amerikas, München, 1859, s. 276,

*reach*, and never in the sense of finding a previously unknown region. This latter meaning he expresses in a way not to be misunderstood: "(I saw) a region never seen before by any one, in ancient or in modern times."\*

As for the fishing ground, Dr. Lechner quotes from Ribero's map an inscription to this effect: "Lands of codfish — there is there nothing of value but the fishery of the codfish, which are of little worth."†

Dr. Lechner's copy of the Ribero map does not agree with the facsimile, reproduced from the original in the Propaganda by W. Griggs, of London, in 1887. In this facsimile there is, in the portion of the New World north of the Gulf of Mexico, but one inscription that resembles Dr. Lechner's quotation and this one reads: "New Land of Corte Real, in which there is nothing of value other than fishery of codfish and much pine timber."‡

Mr. Murphy has made it a reproach to Verrazano's memory that he was hanged as a pirate; but a name is often a matter of convention. Many famous Englishmen would have met the fate of Verrazano if they had fallen into the hands of the Spanish king.

If Verrazano was not only a pirate but an impostor, it must be allowed that he was a very ingenious impostor, for he succeeded in deceiving, not only Frenchmen and Italians, but also the Englishman Hakluyt; and he did even more. He was able to smuggle into the Portuguese archives a dispatch of the Portuguese Envoy

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\*Aver veduto una regione non mai stata veduta da alcuno nè negli antichi nè nei moderni tempi.

†Tierras de los bacallaos. . . . non han alla cosa de proveccho mas de la pescaria de bacallaos, que son de poca estima.

‡Tiera Nova: de Cortereal en la qual no ay otro provecho que pescaria debacallaos y mucha madera de pinos.

Silveira, and into the Parliament archives at Rouen the two documents of the year 1526, as well as to forge the contract with the Admiral Chabot and Jean Ango. Yet more: he must have forged the recently discovered papers which show that Francis I. was expected at Lyons on the 4th of August, 1524, and that Charles V. issued an order for the execution of Verrazano himself. So great was his craft that, without having visited them, he knew that the Narragansett Indians lived under two kings, who were uncle and nephew, just as they did afterwards in the time of Roger Williams.

Verrazano's voyage, says Dr. Lechner, in conclusion, is a piece of history as real as the work of Livingstone or of Stanley.

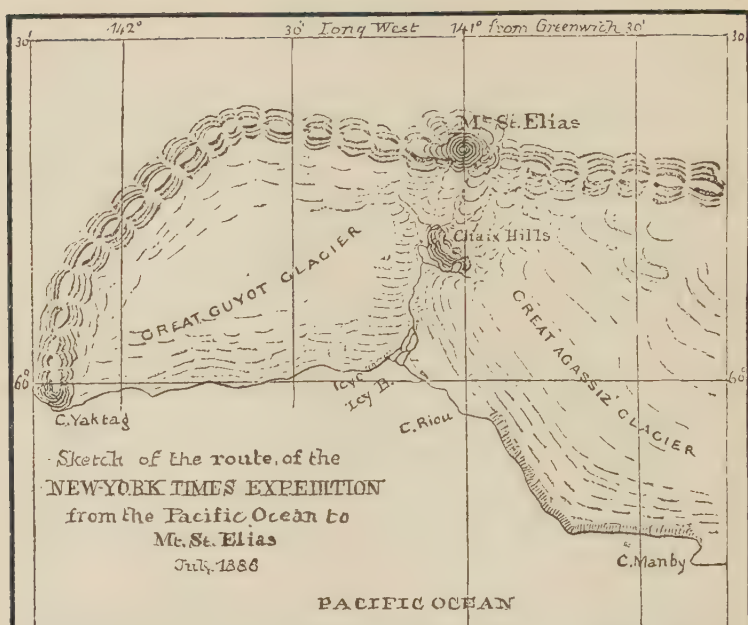
THE TOPOGRAPHY OF MT. ST. ELIAS. — The latest volume (No. XV.) of the *Nouvelle Géographie Universelle* treats of Northern America, that is to say, Greenland, the Polar Archipelago, Alaska, the Dominion of Canada and Newfoundland. These regions are but little known, and it will take time to accumulate exact information concerning any one of them. Every acquired fact must be registered as common property, and theories must be treated as theories, if any advance is to be made. In his account of the Mt. St. Elias region, in Alaska, M. Reclus does not seem always to have kept these points in view.

Mt. Edgecumbe, for instance, which is spoken of on pp. 193-194 as an independent volcano, is a parasitic cone on the side of a much larger crater.\*

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\* See article on "Some of the Geographical Features of South-eastern Alaska," by William Libbey, Jr., in *Journal Am. Geog. Soc.*, Vol. XVIII. (1886), p. 284.





From Journal Am. Geog. Soc., 1886, p. 287.

N° 45. — VERSANT MÉRIDIONAL DU SAINT-ÉLIE.



1 400 000  
0 10 kil.

From *La Nouvelle Géographie Universelle*, Vol. XV., p. 197.

On page 195 M. Reclus mentions a large circular space in the form of a crater, about half way up Mt. St. Elias, below the escarpments on the south-west side, as probably a volcanic vent, though he leaves the matter in doubt. The formation is none the less decidedly non-volcanic. It was found by Professor Libbey\* that the moraines of the glaciers, directly traceable to the amphitheatres on the western side of Mt. St. Elias, must have had a glacial origin. Mr. W. Williams, whose article in *Scribner's Magazine* for April, 1889, is quoted by M. Reclus, describes the crest of the amphitheatre as "covered with schists," a rock that does not belong to volcanoes; and rock specimens brought by him from the crest, and analyzed, show nothing of a volcanic character.

The map on page 197, reproduced by M. Reclus, from the map in Mr. Seton Karr's "Shores and Alps of Alaska," is not to be trusted. It represents the Chaix Hills twisted at an angle of  $45^{\circ}$  from their true line. Mr. Seton Karr's topography is not to be reconciled with Mr. Williams' view† of Mt. St. Elias at the right-hand end of the Chaix Hills, and his description, nor with Professor Libbey's "long, gentle slope of the glaciers leading directly to the giants of the main range."‡ The rocky space shown immediately north of the Chaix Hills is really covered by the Libbey Glacier,§ and the mountain, which occupies the centre of the Guyot Glacier, is not there in fact; while the continuation of the glacier behind should be a series of

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\* *Journal Am. Geog. Soc.*, Vol. XVIII., p. 297.

† *Scribner's Magazine*, April, 1889, pp. 394-395.

‡ *Journal Am. Geog. Soc.*, Vol. XVIII., p. 296.

§ So named by Mr. H. W. Topham, *Proceedings Roy. Geog. Soc.*, 1889, p. 428.

glaciers, moving out towards the Agassiz. There is in M. Reclus' map no indication of a meeting between the two great glaciers, the Agassiz and the Guyot, except at Lake Castani, while they should meet as in Professor Libbey's map; and the Agassiz appears to turn towards Cape Riou, a point it never reaches. M. Reclus accepts with an implied protest "the trivial name of Jones River, given by the Anglo-Saxon visitors to the Yahtsé."\* The name *Jones* is less beautiful and also less Anglo-Saxon than some other names, but M. Reclus will have his hands full, if he means to go through the nomenclature of the Western Continent with a protest against every form that may be accused of triviality. To put only one case, because, like that of Jones River, it is recent; can any name be more trivial and more out of place than that of the "Ferdinand de Lesseps Mountains," superfluously given by M. Chaffanjon to the Sierra Parima? M. Reclus is logically bound to free his mind concerning the French visitor to Venezuela. There is some doubt as to the meaning and the form of the native name for the Jones River, if there is such a name. *Yahtsé* is a Thlinkit word, which Mr. Topham renders by *swampy* or *muddy*,† and Professor Libbey (in a letter) by *cold*. It is a right principle to prefer native names, but most explorers do not obey it, and the Anglo-Saxon visitors to Mt. St. Elias, in 1886, having named a range of hills and two glaciers after eminent Swiss men of science, and a lake after a distinguished Italian, ventured to remember the American patron of their expedition.

\* "Ce cours d'eau, le Yahtsé, auquel les visiteurs anglo-saxons ont donné le nom banal de Jones-river." *Nouv. Géog. Universelle*, Vol. XV., pp. 197-198.

† *Proc. Roy. Geog. Soc.*, 1889, p. 432.

It must be thought that M. Reclus has attached too much importance to Mr. Seton Karr's experiences in Alaska. This gentleman does not seem to have impressed those who travelled with him with the solidity of his acquirements, or the earnestness of his purpose ; and Prof. Geo. Davidson's letter, published in the *Proceedings* of the Royal Geographical Society for 1889, p. 611, convicts Mr. Seton Karr of something less innocent than flimsiness or carelessness.\*

THE HISTORY OF THE NIAGARA RIVER.—The report of the Commissioners of the State Reservation at Niagara, for the year 1889, contains an Essay by Mr. G. K. Gilbert, on the History of the Niagara River. It is difficult to say anything new on such a subject, but Mr. Gilbert has brought together all that is known, or thought to be known, concerning the great Fall, and the causes that have made it.

The region of the Great Lakes, says Mr. Gilbert, is likewise a region of small lakes. In the same region waterfalls abound, while, south of the Ohio, lakes and cataracts are rare. At the south the drainage system is old ; at the north it is young. The explanation of this lies in a great geologic event—the age of ice.

During the ice age the region of the Great Lakes was somewhat in the condition of Greenland. It was covered by an immense sheet of ice, and the ice was in motion, in general, from north to south.

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\* Professor Davidson has noted the following corrections of typographical errors in his letter :

On line 28, *p.* 62 should be *p.* 142.

On line 29, *lat.* 60° 22' 6" should be *lat.* 60° 22' .6.

On line 29, *long.* 140° 54" should be *long.* 140° 54'.



The climate at the southern margin of this ice sheet was relatively warm, and the ice, pushing into this warmer climate, was dissolved, with variations of advance and retreat, caused by the character of the seasons, and the irregular hills, known as the *drift deposit*, were the result. The surface was changed by these deposits and by the erosive action of the ice, and where the ice disappeared the rain that fell could no longer follow old lines of drainage; and so the whole water system was refashioned. In this way the Niagara River was born.

When the ice front had receded so far that it lay to the north of the uplands, which divide the basin of the Great Lakes from that of the Mississippi, but had not yet receded from the Adirondack Mountains, the water from the melting glacier could not escape by way of the St. Lawrence River, but gathered in the form of lakes between the line of the uplands and the ice front. One of these lakes occupied the western portion of the basin of Lake Erie, and has left distinct marks of four changes in its channel of discharge. Lake Erie and Lake Ontario were first separated when the retreat of the ice from the Ontario basin left the accumulated water to flow out by way of the Mohawk Valley, so that the level of discharge was suddenly lowered 550 feet.

The Niagara River began its existence during the series of events that closed the ice age in North America. Its great work has been the digging of the gorge through which it runs from the cataract to Lewiston. In the main, the material dug has been hard limestone and sandstone, interbedded with a coherent though softer shale; but for a part of the distance the material



was incoherent drift. The order of succession of the layers is: a loose sheet of drift, then a bed, eighty feet thick, of Niagara limestone; then the Niagara shale, fifty feet thick; then for thirty-five feet an alternation of limestone, shale and sandstone, known collectively as the Clinton group. This reaches down very nearly to the water's edge. Beneath it, and extending downward for several hundred feet, is a great bed of soft, sandy shale, interrupted, so far as is known, by but a single hard layer, a sandstone ledge, varying in thickness from ten to twenty feet. The hard layers project as shelves and the softer layers are eaten back by the Fall.

The rate of retreat of the Horseshoe Fall is the rate at which the gorge of Niagara grows longer. This rate is not positively known, but Mr. Gilbert is led to believe that it is between four and six feet per annum.

Old as the Niagara River may be, its history is interwoven with the history of man; for, on a gravelly beach of Lake Iroquois (the name proposed by Professor Spencer for the body of water that once occupied the bed of Lake Ontario), there have been found evidences of his presence in a hearth, with ashes and charred sticks.

IDENTIFICATION OF FRANCIS DRAKE'S ANCHORAGE ON THE COAST OF CALIFORNIA.—The question of Drake's second anchorage, decided by Dr. E. E. Hale\* in favor of San Francisco Bay, is definitively settled by Prof. George Davidson, of the U. S. Coast and Geodetic Survey, in a paper read before the California Historical

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\*"Narrative and Critical History of America", edited by Justin Winsor, Vol. III. not (Vol. II. as erroneously noted on p. 22 of the *Identification*), pp. 74-78.

Society in March, 1889, and published by the Society in April of this year. It was not in San Francisco Bay, but under the eastern promontory of Point Reyes Head, that Drake anchored.

In the first two or three years of his work upon the Pacific coast, beginning with the year 1850, Prof. Davidson believed that Drake had entered the Bay of San Francisco; but a closer acquaintance with the physical facts and with the records has brought him to a sounder conclusion.

He says: "I have carefully studied the narratives of Drake's voyage, and the manuscript charts copied from his sketches, or drawn from his personal descriptions; have located his first anchorage; know every foot of the shore he coasted; have tried to see it with his eyes; have sailed the U. S. Coast Survey Brig *Fauntleroy* over the very track he pursued; have conned the shore line, and the crest line, and the landfall from seaward, under varying circumstances of weather; have surveyed Bodega Head, and anchored in Bodega Bay; have been over every rod of Point Reyes Head several times, and have frequently anchored in Drake's Bay in pleasant weather, and under stress of weather, even as lately as last year (1886). I have visited the South and North Farallones, measured their heights, and studied their relation and visibility to the harbor in which Drake anchored. . . . Furthermore, when I look over the list of authorities at my command, that have given opinions upon the subject, some for and some against San Francisco Bay, I fail to note one who was personally familiar with the details of all the localities involved; with the advantages of Drake's Bay as a harbor of

refuge in any storm ; with the peculiarities of the sea-board as it appeared to Drake when coasting it ; with the landfall of Point Reyes Head as he made it ; with the relatively smooth water so soon felt after he rounded the western extremity, and the clear indications of shelter under its eastern point ; and with the impossibility of his sailing direct to the North Farallones, or even to the South-east Farallon, from the Golden Gate of San Francisco with the prevailing summer winds."

Drake had been looking in vain for a northern homeward route and was returning along the California coast in search of an anchorage, where he might refit his damaged vessel. That he made a careful examination is proved by the fact that he occupied ten days in sailing from latitude  $42^{\circ}$  to latitude  $38^{\circ}$ , in the season of favorable winds.

It was not till he reached the lee of Point Reyes that he found a "faire and good bay, and a good winde to enter the same." From Point Reyes he could not see the entrance to the Bay of San Francisco, nor a sign of a harbor in that direction. If he had entered San Francisco Bay, he must have left a description of so unique an entrance and so magnificent an inland sea. He was impressed by the white cliffs that were every day before his eyes from his anchorage, and in the vicinity of the Golden Gate these cliffs do not exist. The Farallones, which he saw "a little without" his harbor, are below the horizon of the Golden Gate, and even after he left his anchorage he could not have reached them from San Francisco with the summer winds without making several tacks towards Point Reyes ; but from Drake's

Bay he could visit them without going out of his course.

The most convincing evidence is in the manuscript chart No. 85 of Dudley, with "B:di Nova Albion," and in the "Carta Particolare.\*" In these a nearly identical line of soundings is laid down in the approaches and in the channel way of the bay in which Drake anchored.

They stand 8, 5, 4, 3 fathoms to the anchorage. Between the heads of the entrance to San Francisco Bay, the depths would have been 20 fathoms; in the Golden Gate 60 fathoms, if the currents would have let the lead reach the bottom; over the Presidio shoal 3 or 4 fathoms, then 10 or 12, under the south shore, and 20 to 15 fathoms dangerously close under the north shore.

The *Golden Hind* could hardly have sailed against the ebb current which Professor Davidson has measured, running out of the Golden Gate at a rate of  $6\frac{1}{10}$  knots; and with a flood current the vessel would have been swept through with a threatening velocity.

Some persons will refuse to give up the belief that San Francisco Bay took its name from the bold English explorer who struck terror, as Dr. Hale puts it, to all the western coast of New Spain. The belief is none the less a delusion.

SOME UNEXPLORED REGIONS OF CANADA.—Dr. G. M. Dawson read before the Ottawa Field Naturalists' Club, in March last, a paper on some of the larger unexplored regions of Canada. Many of these areas lie to the north of the limit of profitable agricul-

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\*These are reproduced, with thirteen other charts, in the *Identification*.

ture, which Dr. Dawson defines by the isothermal line of 60° Fahrenheit, in the month of July.

This line passes through the southern part of Newfoundland, touches the island of Anticosti, runs to the north end of Mistassini Lake, and across Hudson Bay to a point a little to the north of York Factory. Thence it runs westward, past the north end of Reindeer Lake, and then northwestwardly, crossing Great Slave Lake and touching the southern extremity of Great Bear Lake. From this point its direction is westward to the Yukon River, a considerable distance to the north of the confluence of the Pelly and Lewes. Almost on the eastern line of Alaska it turns to the south.

Most of the regions available for wheat production are already known; but Dr. Dawson looks forward to the not distant day when there will be a demand for lands suited to the cultivation of the hardier crops, such as barley, oats, hemp, etc. He enumerates sixteen practically unknown districts:

1. An extent of 9,500 square miles, lying between Alaska, the Porcupine River and the Arctic.
2. The area between the Lewes and Yukon rivers, and the boundary of Alaska. This contains about 32,000 square miles.
3. A space of 27,000 square miles bounded by the Coast Ranges on the west and by the Lewes, Pelly and Stikine rivers.
4. The territory embracing about 100,000 square miles, between the Pelly and Mackenzie rivers. This includes nearly 600 miles in length of the main Rocky Mountain range.

5. The country between Great Bear Lake and the Arctic Ocean. This covers 50,000 square miles.

6. About 35,000 square miles, lying between the Great Bear Lake, the Great Slave Lake, and the Mackenzie River.

7. The territory bounded by the Stikine and Liard rivers on the north, and the Skeena and Peace rivers on the south ; a tract of 81,000 square miles.

8. About 7,500 square miles lying between the Peace, Athabasca and Loon rivers.

9. About 35,000 square miles, to the south-east of Athabasca Lake.

10. The area of 7,500 square miles between Bathurst Inlet on the east and the Coppermine River on the west.

11. The territory of about 31,000 square miles, comprised between Back's River and the Arctic.

12. The vast region surrounded by Back's River, Great Slave Lake, Athabasca Lake, Hatchet and Reindeer lakes, Churchill River and the west coast of Hudson Bay, with an area of 178,000 square miles. Dr. Dawson remarks that the only authority for the lakes and rivers in the map of this region is Hearne, who wandered through parts of it in the years 1769-1772, but no reliance can be placed upon his accuracy ; and the geographical results of Schwatka's journey across the extreme north-eastern part of this\* territory are said to "possess little value ;" possibly, for Schwatka had other results in view.

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\* Dr. Dawson makes a reference to "Schwatka's Search by H. W. Gilder." The author of *Schwatka's Search* is Mr. William H. Gilder, whose name is printed on the title-page of the book. The difference between William H. and H. W., though slight, is equivalent to the difference between George M. and M. G., and is, so far, worthy of attention.



13. The country between the Severn and Attawapishkat rivers and Hudson Bay; an extent of 22,000 square miles.

14. The area of 15,000 square miles between Trout Lake, Lac Seul and the Albany River.

15. About 35,000 square miles south and east of James Bay.

16. Almost the whole interior of the Labrador peninsula, estimated at 289,000 square miles.

These measurements, added together, make up nearly 1,000,000 square miles that wait for the explorer, to whom Dr. Dawson addresses, at the close of his paper, a few words of counsel.

POPOCATEPETL.—The Philadelphia scientific expedition to Mexico and Central America made an unfortunate beginning with the measurement of Popocatepetl, by Profs. Heilprin and Baker, who ascended the mountain in April last, and announced, on their return, that their calculations reduced its height from 17,884 feet to about 14,700 feet. The Mexican scientists received this information with mingled surprise and derision, and the Northern professors were made to see the error of their way. Not the instruments, but the men who handled them, were at fault; a thing pardonable in itself, in the absence of any previous knowledge of the point in question, but not to be excused, in full view of the many recorded measurements of Popocatepetl, beginning with Humboldt's in 1803. Humboldt says in the *Essai sur la Nouvelle Espagne*\*: "Between the capital of Mexico and the little cities of Cordoba and

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\* 2me Edition, Paris, 1825, Tome I, p. 265.

Jalapa is a group of mountains that rival the loftiest summits of the New World.

"It is enough to name four of these, the height of which was unknown before my journey: Popocatepetl (5,400 metres, or 2,771 toises), Iztaccihuatl (4,786 metres, or 2,455 toises), Citlaltepétl, or the Peak of Orizaba (5,295 metres, or 2,717 toises), and Nauhcampatepetl, or the Cofre de Perote (4,089 metres, or 2,089 toises)."

He adds in a note that these measurements are geometrical, excepting that of the Cofre. This mountain he ascended, taking his instruments with him, on the 7th of February, 1804.

The figures given for Popocatepetl are equal, respectively, to 17,716.86 and 17,719.416 English feet.

Since 1803 the mountain has been measured by observers of various nations, and always with a result very like that obtained by Humboldt. Among these observers were the brothers Glennie, Baron Gros, Baron von Gerolt, August Sonntag, Dollfus, Pavie, Miguel Ponce de Leon, A. Garcia Cubas, Edward B. Tylor, and M. Jules Leclercq. The lowest elevation is that of 5,391 metres (17,687 feet), given by Miguel Ponce de Leon, and the highest that reported by the Glennies, 17,884 feet. M. Leclercq, who made the ascent in 1883, says: "My personal observations, combined with those of Mr. Roy, one of my companions, and those of Mr. Bárcena, the director of the Observatory at Mexico, who during our expedition registered the readings of the barometer at Mexico, gave the figures of 5,420 metres (17,782.48 feet) for the Pico Mayor, the culminating point of the mountain." Whether Popocatepetl is higher or lower than some other mountain is, in

itself, a matter of small consequence ; but it does no credit to professors of science to pass lightly over the work of their predecessors, and to assume infallibility for themselves.

RECENT CHARTS OF THE U. S. HYDROGRAPHIC OFFICE,  
WASHINGTON, D. C.—

- No. 1120.—East coast of Central America ; Gulf of Honduras and approaches.
- No. 1165.—West Indies : Island of Saint Lucia, Port Castries.
- No. 1166.—West Indies : Anchorages Island of Saint Lucia ; Grand Cul de Sac Bay and Mari-got Harbor.
- No. 1168.—British Guiana : Mouths of the Demerara and Essequibo rivers.
- No. 1170.—Eastern Archipelago : West part of Java Sea and Southern Passages to China.
- No. 1172.—Peru : Huacho Bay and Chancay Bay.
- No. 1173.—Nova Scotia : Sheet Harbor and Adjacent Anchorages.
- No. 1174.—Chili : Ports Caldera and Calderilla.
- No. 1175.—West Coast of Newfoundland : Ports Saunders and Keppel and Hawke harbors.
- No. 1176.—South America : Coasts of Colombia and Ecuador, Panama to Cape San Francisco.
- No. 1177.—South America : Coasts of Ecuador and Peru, Cape San Francisco to Paita.
- No. 1178.—Peru : Coast from Paita to Pisco.
- No. 1179.—Dominion of Canada : Gulf of St. Lawrence, Miramichi Bay (New Brunswick).

- No. 1180.—Peru : Independencia Bay.  
No. 1181.—Chili : Cobija Bay and Gatico Cove.  
No. 1182.—West Coast of Newfoundland : Savage  
Island Anchorage and Old Port au Choix.  
No. 1183.—Peru : Port Islay and Port Mollendo.  
No. 1184.—Peru : Port Santa.  
No. 1185.—Peru : Port Samanco, or Guambacho.  
No. 1186.—Nicaragua : Harbor of San Juan del Norte,  
or Greytown.  
No. 1187.—Argentine Republic : Bahia Blanca.  
No. 1188.—Eastern Archipelago : Java, Batavia Roads.  
No. 1189.—Supplement to H. O. Chart 68 (of Behr-  
ing's Sea and Arctic Ocean).  
No. 1190.—Peru : Casma Bay and Huarmey Bay.  
No. 1191.—Brazil : Rio Grande do Sul.  
No. 1192.—West Coast of Lower California : South  
Bay (Cerros Island).  
No. 1193.—West Coast of Lower California : San  
Quentin Bay to Cerros Island.  
No. 1194.—West Coast of Lower California : San  
Benito Islands.  
No. 1195.—Peru : Lomas Road and Ports of San Juan  
and San Nicolas.  
No. 1196.—South Coast of Cuba : El Portillo.  
No. 1197.—Arctic Ocean : Dominion of Canada, Sketch  
of Herschel Island.  
No. 1198.—Guano Islands in the Pacific : Baker Island  
and Howland Island.  
No. 1199.—Peru : Ilo Road.  
No. 1201.—Peru : Port Bermejo.  
No. 1202.—Chili : Port Papudo and Horcon and Quin-  
tero Bays.

No. 1204.—West Coast of Lower California : Port San Bartolomé.

No. 1206.—China Sea : Singapore New Harbor.

No. 1209.—Chili : Approaches to Coronel and Lota (Arauco Bay).

No. 1210.—West Indies, Island of Santo Domingo : Manzanillo Bay.

No. 1211.—Guano Islands in the Pacific : Canton Island (Swallow, or Mary Island) ; Canton Island Anchorage ; Phœnix Island.

No. 1212.—Chili : Lavata Bay and Pan de Azúcar Anchorage.

No. 1213.—Peru : Salaverry Road.

No. 1214.—Peru : Atico Road.

Pilot Charts of the North Atlantic ; January, February, March, April, May, June.

A SIMOOM AT MASSOWAH.—M. Antoine d'Abbadie relates, in the *Bollettino* of the Italian Geographical Society for March, his experience of the desert wind on the 22d of September, 1841.

He was at Addi-Hadib, on the mainland, near Masowah, and proposed to study the simoom (Samuwn) which, according to a theory no longer accepted, was then about to blow. He had taken his seat in front of a stone on which were his thermometers, so near that he could reach them with his hand. The wind came, and with its first breath he found himself so weak that he could not lay hold of the instruments. He took them when the wind ceased. The humidity registered was  $\frac{7}{10}$  and there was a difference of only 1.7 degrees between the thermometer with a black bulb and the one with the

plain bulb, though both were exposed to the sun. It was about two o'clock in the afternoon. The sand on the surface marked 60 degrees (140° Fahr.) and the velocity of the wind was not greater than that of an ordinary breeze. It lasted five minutes and fell as abruptly as it rose; and it brought with it neither dust nor sand.

A native told M. d'Abbadie that this wind was called *Karuw*, and that if it blew for a quarter of an hour, neither man nor beast could live through it. At such times the shepherd, posted as a sentinel on the top of a hill, knows that the *Karuw* has killed the people when he sees that no one of them rises from the ground, on which they throw themselves to breathe.

M. d'Abbadie's reminiscence is meant to correct a statement made in a paper by Robecchi-Bricchetti, in the *Bulletin* of the Khedivial Geographical Society, Third Series, No. 2, in the following words:

"In this *wady* the wind is laden with a suffocating dust, which darkens the air. A shower of gravel and sand pelts the face and hinders the breathing, so that the head has to be covered, all but the eyes, which grow red and weep. This is all the harm that comes of the simoom, the much abused wind of the desert, made so terrible by the imagination of travellers."

In this description M. d'Abbadie recognizes the *harif*, a wind that brings clouds of choking dust, on which all living creatures turn their backs for defence;\* and he affirms that there is not even a touch

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\* This is almost in the words of Dante:

Dinanzi polvoroso va superbo,  
E fa fuggir le fiere ed i pastori.



of exaggeration in the received accounts of the simoom.

THE PASSING OF VOLAPÜK.—An advertisement in the London *Athenæum*, of April 19, invites those who are interested to join a proposed International Society for the adoption of the Latin language as a substitute for Volapük. The invitation is a curiosity,\* worthy of preservation; and the obvious *commentatio* is that Volapük has nearly run its career.

There will be few to weep for a phenomenon, that was never a thing of beauty.

THE PORTUGUESE IN SOUTH AFRICA.—M. Gabriel Marcel devotes an article in the *Revue de Géographie*, for March, to an examination of the record concerning the Portuguese explorations in Southern Africa from the time of Vasco da Gama; not to reproduce the record, for that would require a volume, but to bring out two or three salient, though strangely neglected, points in the history of geographical discovery. M. Marcel's sympathies are with Portugal in her conflict with England. "Here," he says, "at the end of the XIX century is another illustration of the old adage that Might makes Right. And the country that employed iron-clad ships and cannon in the place of sound arguments was the very same England, that has always claimed to be the apostle of justice and the champion of freedom. What a bitter mockery! Assuredly, when she

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\* LINGUA LATINA contra VOLAPÜK.—Propositum est Societatem Internationalem instituere, et linguam Latinam accurate ad tempus adoptare. Cui res est curæ, nomen, cum commentatione qualibet deponat apud SOCIETATIS SCRIBAM, Sell's Advertising Offices, London.

had matter of dispute with Germany, the doughty Albion used no such arrogance of language, nor was she in such haste to show the steel of her sword. She bent herself with humility before that antagonist."

M. Marcel takes a good part of his material from Mr. T. E. Bowdich's book: "An Account of the Discoveries of the Portuguese in the interior of Angola and Mozambique," published in London in 1824.

The expeditions and the effective possession of the country by posts and trading stations are described by Bowdich on the authority of official documents, and M. Marcel has found in the National Library in Paris a map, that establishes the truth of these documents and the antiquity of the Portuguese occupation.

This map is a MS., which forms part of a collection that once belonged to the Abbé Michel-Antoine Baudrand, a geographer who died in 1700. It is without date; but M. Marcel, from a study of the handwriting, the orthography, and the texture of the paper, assigns it to the last twenty years of the XVII century.

His decision in such matters is not to be lightly questioned; and he remarks that no other map in the volume bears a date subsequent to 1700.

At Baudrand's death, his collection became the property of the abbey of Saint-Germain des Prés; it passed, at the end of the Revolution, into the library of the Tribunat, of which it bears the stamp, and finally came to the National Library, where it is numbered 388 in the geographical section.

This map of the "Empire of Manamotapa" measures 20 in. x 13 in.

It shows with comparative accuracy the course of the

Zambezi ; the falls and rapids of Kebrabasa and the cataract of Morumbua are marked by inscriptions, which state that the river, navigable for two hundred leagues below, here suddenly ceases to be so, and deepens again farther on.

There is a fort of São-Estavão, which M. Marcel has not identified, another named Chicova, and market towns like Mazapa and Mauzovo, called *feiras*. Some of the inscriptions denote the presence of gold : *Terras de moca Ouro, minas de Ouro* ; and in one place, on the left bank of the Zambezi, the gold is said to be of fine quality. The course of the Shiré is traced in a direction approximatively correct, and the country is described as populous and very fertile ; but there is no indication of the lakes Nyassa and Tanganyika.

In the maps of Mercator, Bertius, Hondius, Meursius, Sanson and Duval, the Cuama, or Zambezi, is drawn in a purely fanciful manner ; but on the famous Coronelli globe (1683) it is represented as in the MS. map. It is evident that the Venetian geographer had access to Portuguese documents now lost. On this huge globe (published in a reduced form by Deuwez in 1688) the Shiré is without a name, but M. Marcel quotes the following inscriptions : *Citta e Fortalezza de Tete de Portog., Empango, fortezza de S. Estevao, anavegacao lago, fortezza de Chicova* (on the Zambezi, in the place now occupied by Zumbo), *Regno de Chicova*, and *Minere d'argento ch' il re di Monom. promise al Re di Spagna nel 1604.\**

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\*Most of these inscriptions explain themselves. *Empango* is a native name ; and it is only necessary to recall the fact that Portugal formed a part of the Spanish monarchy in the period 1580-1640 to understand why the King of Monomo-

In a map of 1689 Coronelli marks on the left bank of the Zambezi, near the Shiré, a fortress named *S. Mar-tial*. This is reproduced by de Fer, in 1698, and he also gives the name of Figueiral to a site in the interior of Mashonaland. G. Delisle, in his "Map of the Congo and the country of the Caffres" (1708), and D'Anville, in his "Western Ethiopia" (1732), give the Zambezi River as it is represented in the MS. map, in Coronelli and in de Fer; and the inscriptions in these latest maps attest the presence of the Portuguese in the far interior. M. Marcel quotes the testimony of Bowdich to the same effect: "Zumbo," he says, "where the Portuguese have a factory, is on the Cuama (Zambezi), thirty days' march from Tete. The first fifteen days the traveller must go by land as far as Chicova, so as to avoid a cataract called Sacumbe; but beyond that point the navigation is free. Zumbo, though it is without fortification and is surrounded by forests, is an important trading station, to which is brought the gold from the mines of Abutua, Pemba and Murusura, besides ivory from the Orange River, rhinoceros' horns, and other merchandise."

The Maravi\* (Nyassa) Lake is described by Bowdich, not inaccurately, though he gives it a longitudinal direction to the N.N.E., and identifies it with the Tan-

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tapa, in 1604, promised silver mines to the King of Spain. One of the legends—*anavegacao lago*—looks like an attempt at a Portuguese sentence—a *navegação* (*do*, or *ao*) *lago*—but a reference to Coronelli's map of 1689 shows that the correct reading is *Ananegacano Lago*, the native name of a lake on the upper Zambezi, where modern maps show no lake at all.

*Figueiral*, the name of the site in Mashonaland, given by M. Marcel on the authority of de Fer, appears to be the *Figueral de Mesures* of Coronelli's map.

\* M. Marcel inadvertently makes this the Tanganyika.

ganyika ; "for," he says, "it is known that it reaches as far as the latitude of Mombasa, and even beyond that."

M. Marcel is surprised that Pereira's expedition of 1796, recounted at considerable length in Bowdich's book, has been so completely overlooked by later writers. Pereira set out from Maringa, three days' march to the north of Tete. He crossed a swift stream, the Arwangoa (Loangwa), which the natives said communicated with the Zambezi, near Zumbo. Here he left some slaves, and entered the territory of the Movizas, "and at the end of eleven days, during which he travelled at the rate of five or six hours in the twenty-four, he came to another river, called by the Movizas Zambese, but which he was convinced could not be the stream of the same name that passes Tete, because this new Zambese, as he terms it, flows in a different direction, and falls into another river of which notice will be taken hereafter." *Bowdich*, pp. 87, 88.

This *Zambese* is the Chambezi, that flows into Lake Bangweolo, and is now known to be one of the sources of the Congo River. "Livingstone," says M. Marcel, "was in error when he believed that he had discovered the Chambezi ; he merely followed in the footsteps of the true discoverer, Pereira."

Crossing the Chambezi, Pereira and his people entered the territory of Cazembe. For nineteen days they marched through a desert region, and spent nearly a whole day in struggling through a shallow lake, out of which flowed a broad river named Murusura. On the bank of this river stood the capital of Cazembe. Bowdich gives many details of Pereira's reception by the King of Cazembe, who parted with his visitor only

on the assurance that he would return before long. This he did in 1798, in company with Lacerda, the Governor of Tete.

Lacerda intended to complete the explorations begun two years before, but he fell sick, and died on the bank of the Chongu.\*

The expedition of 1831, under Major Monteiro and Captain Gamitto, is noticed by Livingstone in these words: "Monteiro went nowhere and did nothing, but some of his people got as far as the Luapula, which is about six miles away. In his report the major complains of having been robbed by Cazembe.

"I asked the headman why Monteiro's property had been taken from him, and was told that he knew nothing of the matter, because he was then in another village. Ben-Séli, who had been on the spot, spoke up and said that Monteiro's assertion was false; that he had suffered no violence, but that there was a scarcity of food, and the major's merchandise was bartered for provisions, instead of ivory and slaves, and that he had then invented the story of the robbery to put off his creditors."

M. Marcel observes that an escort, a guard of honor, was furnished to Monteiro by Cazembe. Kapika, an old man, still living, was one of the commanders, if not the chief of this escort, and he relates that he went with Monteiro to Tete, and Sena, and Quilimane. It is not to be supposed that this guard would have been offered or accepted if the major had really been plundered by Cazembe.

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\* Arrowsmith marks the latitude of this place  $8^{\circ} 43' S.$ , but M. Marcel makes it  $9^{\circ} 32'.$



M. Marcel, in closing his paper, invites the attention of his readers to the unvarying colonial policy of England: "In the region of the Nyassa, the Tanganyika, and the Victoria, as in every other part of the world," he says, "the missionaries open the way to the traders; and when the traders have taken firm root in the country, a royal charter is granted, and then the country is annexed."

So far his readers will go with him; but when he affirms that this sinister alliance of religion and commerce is only to be seen in England, he surely forgets the history of other countries. Is there any colonizing nation that does not seek to profit, in a material way, by the labors of its missionaries? Relatively to the extent of her interests, England does no more of this sanctimonious trading than any other Power; and M. Marcel seems to beat the air when he denounces her.

HOW TO TRAVEL IN THE SAHARA.—E. M. writes to the *Bulletin de la Société de Géographie Commerciale de Paris*, Tome XII., No. 2, a report of a conversation had with some Tuareg friends, in Algiers, on the subject of M. Douls, and his tragic death on the way to Timbuktu.

These Tuaregs were temporarily confined in one of the forts, and the interview took place on the terrace, which overlooked the city and the blue sea beyond.

E. M. remarked the beauty of their naked feet, with high-arched insteps. "When Kenan sets down his foot," he says, "I can pass my cane under it, between the ball of the foot and the heel."

The Tuaregs asked if there was anything new. Their

visitor translated from the *Journal des Débats* the account of the death of M. Douls ; and his hearers expressed their surprise that an *infidel* had been able to obtain letters of recommendation from the emperor of Morocco, in their eyes the true, and possibly the only, sovereign of the Mussulman world.

When the reader came to the hiring of the guides by M. Douls, the Tuaregs recognized the names *Idhenan*, *Ibodhtanaten*, as those of tribes subject to the Aulimiden of the Adhar. No remark was made on the description of the way in which the guides were engaged ; but the suggestion that the display of money by the traveller had excited his men's cupidity, and had been the cause of his death, met with immediate assent.

E. M. adds that greed is the master passion of the Tuaregs, who will strip their best friend, and clothe him afterwards.

The traveller's only security is in the sentiment of honor, which exists among the nobles.

M. Douls was strangled by his guides at the well of Ilighen, while he slept. The Tuaregs listened to the recital of the deed without showing pity or surprise ; but they were disposed to suspect the men of the caravan, with whom Douls had journeyed, of complicity with his guides.

There was silence for a time after the reading. Kenan ag Tissi spoke at last, in a quiet tone : " That traveller was a man of no great standing. He ought to have had more self-respect than to associate with such creatures as the serfs of the Aulimiden. You said that he went into the Tuat with letters from Muley-Abd-er-Rahman. I supposed, therefore, that he was a

man of distinction ; and the first thing he does is to engage two Ibodhtanaten, people that he does not know, then to go off alone with them, and to pay them in advance. Men that come recommended by Muley-Abd-er-Rahman do not act with such a want of discretion.

"I heard you read also that he had been well received by the marabouts of the Tuat and particularly by the marabout of Aulef. It would therefore have been easy for him to find safe guides. He had only to ask for them.

"It is true that the marabout might have made him wait ; but travellers must have patience. I think, moreover, that he ought not to have gone forward until his safety had been in this way guaranteed by the marabout."

"But," answered E. M., "M. Douls had a great deal of experience in these matters ; he had lived a long time in the Sahara with the Reghibat and the Aulâd Delim." "Those are people whom I know by reputation ;" said Kenan ; "they are marauding Arabs of the West, who sometimes pay us tribute. I know nothing of their ways, but among ourselves a man is respected, or not, according to his company. A Frenchman, travelling with Sidi (Ag Kerrazi, Kenan's uncle) would be safer in the Ahenet than in Paris ; but we certainly should not be answerable for a man who risked his life in our desert, as M. Douls did, with two worthless fellows." "Worthless fellows," replied E. M., "are common enough in the Sahara, and those two are of the worst ; for the man they assassinated was, so far as they knew, a real Mohammedan pilgrim." At these words the Tuaregs

laughed, and Kenan made answer : "It is impossible for a European Christian to disguise himself completely like an Arab Mussulman. There will be something in his walk, or his gestures, or his language, that will betray him. Remember also that the Tuat is full of intelligent people, who know you Frenchmen perfectly well and have even lived among you. They take no offence at finding you there, because their belief is that you have no religion, and they are glad to hear you repeat in Arabic that there is no God but God and that Mohammed is His prophet. At the same time they ask themselves what you are doing there, and they distrust you, at the very moment when you are in need of their confidence. When another Frenchman proposes to cross the Sahara, and to dwell among the Tuaregs, tell him first of all never to lie, for lying is the mark by which we recognize serfs and slaves.

"Let him travel, if he has succeeded in gaining the friendship of an Amr'ar, with his face uncovered, and dressed like a Frenchman, just as we, when we go to Paris, wear our black robes and our veils. If he takes part in a council, let him appear in full dress and declare that he does it out of respect to the assembly. When we went with you to visit your friends, we wore our red caps with blue silk tassels, our red girdles and broad belts. Then people know that they are dealing with a real Frenchman. If they insult him, or attack him on his way, that will be a serious matter, and you will be able to call them to account for it ; but I repeat that there will be nothing to fear if the traveller has the friendship of an Amr'ar. If, on the contrary, he dresses like an Arab, in an old burnoose, and rides on

a baggage camel like a low slave-dealer, nobody will care for him, and you know very well that the Arabs kill each other every day in the Sahara. That concerns us no more than it does you. If a man chooses to mingle with the low, he must take the consequences. Not even the letters of Muley-Abd-er-Rahman will give him dignity, nor will any one of the Tuareg nobles, who keep order in the desert, take the trouble to watch over him, or to avenge him."

E. M. remarks, in closing, that Richardson, Barth, and Duveyrier, the only Europeans who dwelt among the Tuaregs in the Sahara and returned in safety, followed the method prescribed by Kenan ag Tissi.

#### TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

BRUSSELS.—*Le Mouvement Géographique.*

Stanley Africanus—The Congo Celebration at the Bourse—The Congo Railway—at Kassongo—Colonial Policy (Notice of M. Jules Ferry's book *Le Tonkin et la Mère-Patrie*)—The Brussels Conference—A Belgian Scientific Expedition to the Congo—The Lualaba—The Upper Congo Flotilla—A Congo Chief and the Palavers—Capt. Delporte's Exploration.

EDINBURGH.—*The Scottish Geographical Magazine.*

Border-Lands between Geology and Geography—The Vertical Relief of the Globe—Southern California: Past and Present—Scandinavia: The Vikings and the Geography of their Times—Recent Explorations in Peru and Bolivia—Sir W. Macgregor's Discoveries in New Guinea—Geographical Notes on the Country

between Lakes Nyassa, Rukwa and Tanganyika—The Mapping of the World—Map Projections.

GOTHA.—*Petermanns Mittheilungen*.

Report on the Bremen Geographical Society's Expedition to Eastern Spitzbergen in 1889—On Mean Differences of Boundary—Dr. Peters' Expedition—New Surveys in the Higher Caucasus by the Russian \*General Staff—Equivalent Map-Projections—Bokhara on the Threshold of the New Era—Travels in the East India Archipelago—Letters from Emin Pasha—The New Island in the South Sea (Falcon Island)—The Way to the North Pole Nordenskiöld's Facsimile Atlas—The Caravan Route from Zeilah to Ankober and the Cartography of the Somali, Afar (Danakil) and Galla Countries—The Projected Harbors on the western Coast of Schleswig—Inquiries concerning 24 Tongues in the Region of the New-Guinea Company's Protectorate—Emin Pasha's Meteorological Diaries—Rainfall at the Capital of Madagascar—Completion of the Special Map of the Austro-Hungarian Monarchy—New Traces of Leichhardt—Fluctuations of the Earth's Axis.

*Ergänzungsheft Nr. 97.*

Zones of Cultivation in Northern Abyssinia.

LONDON.—*Royal Geographical Society, Proceedings.*

Journey to the summit of the Owen Stanley Range, New Guinea—Mr. J. T. Last's Map of Eastern Africa, between the Rovuma and the Zam-



bezi—Mr. H. H. Johnston's Journey North of Lake Nyassa and Visit to Lake Leopold—Notes of a Recent Visit to Peru and Bolivia—Search and Travel in the Caucasus (by Douglas W. Freshfield)—Geographical Results of the Emin Pasha Relief Expedition (H. M. Stanley)—Ascent to the Summit of Kilimanjaro—Notes of a Journey through Mashonaland in 1889.

PARIS.—*Société de Géographie, Compte Rendu.*

Notice of the decease, at Algiers, on the 22d February, 1890, of M. Edouard Charton, founder of the publication, *Le Tour du Monde*—The Dunes of the Sahara (M. Rolland)—Recent Events in Uganda—Explorations in Madagascar (MM. Maistre et Catat)—Railway across the Sahara (M. Rolland)—M. Deflers in Arabia—Bouvalot in Central Asia—Dauvergne in Kashmir—Fontaine in Laos—Letter from H. Coudreau in Guiana—M. Edouard Blanc on the Railway across the Sahara—L'Abbé Desgodins and his Recollections of Thirty-four Years in Tibet—The Congress of French Geographical Societies at Montpellier (May, 1890)—Note on Formosa, by M. Romanet du Caillaud—Letter written from Cacheo (Portuguese Guinea), by M. E. Bonvalet—The City of *America* (Nicaragua), founded January 1, 1890—Election of M. de Quatrefages to the Presidency of the Society—Mr. Karl Schroeder's Plan of the Earth's Surface—The Remains of

Camille Douls—Capt. Courbis on the Dunes of the Sahara (in reply to M. Rolland)—Capt. Alfred Le Chatelier on the Dangers of an Expedition to In-Salah (in reply to M. Rolland)—Ascent of Clarence Peak, in Fernando Po, by M. Etienne de Rogozinski—Letter of M. H. Pitter, Director of the Observatory, San José, Costa Rica, on the Earthquake of January 10, 1890—Recent Cartographical Publications of the Russian General Staff—The Tomb of Dumont d'Urville—Nansen's North Pole Expedition—Capt. Grombtchevsky in Central Asia—M. Dauvergne in Central Asia—The Trans-Sahara Railway (remarks by M. Fock)—The Earthquake in Costa Rica—M. A. de Lapparent on a New Cause of the Mobility of the Earth's Crust—The Scientific Study of Lakes (M. Thoulet)—Archæological Expedition of M. N. Yadrintsef in Northern Mongolia (under the auspices of the Irkutsk Branch of the Imperial Russian Geographical Society).

*Bulletin.*

Explorations in Russian Lapland, or the Kola Peninsula (1884-1885) by Charles Rabot—From the Pacific to Pará (Marcel Monnier).

ROME.—*Società Geografica Italiana, Bollettino.*

Itinerary in Ethiopia—Ancient and Modern Abyssinia—The Cascade of the Maletsuniane (affluent of the Orange River, in Basutoland)—A Simoom at Massowah—The Portuguese at Massowah in the XVI. and XVII. centuries—

A New Work on the History of Mediæval Geography (Dr. Kretschmer's *Die Physische Erdkunde im christlichen Mittelalter*—Sir Henry Yule—Mercator and his Maps—The Somali, Galla and Harari spoken Languages—The Letter written by Emanuel of Portugal to Ferdinand and Isabella concerning the voyage of Cabral, on his Return from Brazil to the Coast of Africa (1500–1501)—Mines in the Republic of Colombia—Drawings made by Bushmen.

VIENNA.—*Kais. Königl. Geographischen Gesellschaft, Mittheilungen der.*

Travels of a Naturalist in the Western Canary Islands—Contributions to the knowledge of the Mandayas (in Mindanao), by Blumentritt—

WASHINGTON.—*National Geographic Magazine.*

On the Telegraphic Determinations of Longitude by the Bureau of Navigation, by Lieut. J. A. Norris, U. S. N.—Reports of Vice-Presidents—The Rivers of Northern New Jersey, with notes on the classification of rivers in general : William Morris Davis—A Critical Review of Bering's First Expedition, 1725–30, together with a translation of his original Report upon it : Dr. Wm. H. Dall—Supplementary Note on the alleged observation of a Lunar Eclipse by Bering in 1728–29 : Marcus Baker.

## WASHINGTON LETTER.

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WASHINGTON, JUNE 20, 1890.

GEOGRAPHY OF THE SEA.—There is no branch of the Government service with a better record for disseminating practical and valuable information, than the United States Hydrographic office. A large share in the progressive state of the science of the geography of the sea, must be credited to its systematic collection of marine observations. In addition to the numerous charts, sailing directions, lists of lights, etc., which are permanent and standard publications, but continually revised according to the latest data supplied by thousands of correspondents in every part of the world, it issues monthly the well-known Pilot-chart of the North Atlantic (also a weekly supplement), and weekly, the *Hydrographic Bulletin* and a pamphlet entitled *Notices to Mariners*. The two former are issued from the division of Marine Meteorology, in charge of Everett Hayden, U. S. N., retired; the newest branch of the Office, but one that has already proved its usefulness.

The *Bulletins* contain descriptions of derelicts, wreck-ages, marine accidents, etc., and where located, and ice reports. The issue for June 6th had ninety-eight separate items. The *Notices to Mariners* describe newly discovered shoals, banks, dangerous rocks, changes in channels, lights, buoys, fog signals, etc. The Pilot chart is one of the most popular publications of the Government. Its high standard of efficiency, useful-

ness and reliability, is constantly and favorably commented upon both at home and abroad. Its value to commerce and to trans-atlantic steamers cannot be overestimated. The publication originated with this office, and it has no competitor. It delineates graphically the currents of the ocean, the changes that take place in them during each month, the quickest and safest routes where the best conditions for favorable passages are to be found, the probable limits of fogs, the locations of wrecks and changes in such locations, the course of derelict vessels, meteorological phenomena, on which is based a forecast of the weather for the month immediately following the date of issue, and the location and course of bergs and ice fields.

The chart for June illustrated the position and dates of icebergs reported during May. The region is south-east of Newfoundland and south and east of the Grand Banks. The routes plotted for the trans-atlantic steamers are south of this region. According to Lieut. Richardson Clover, of the Hydrographic Office, these enormous masses of ice drift down past the east coast of Newfoundland and far down along the eastern edge of the Grand Banks; but upon approaching the 41st parallel they reach the warm easterly-moving Gulf Stream current, and their southerly progress is arrested. Many of them hang about the tail of the Grand Banks, about  $24^{\circ} 30'$  north, longitude  $50^{\circ}$  west, while others drift slowly off towards east-north-east, gradually melting and breaking up. He says that the idea that there is ice to an indefinite distance to the southward, and that it cannot be escaped is a vital mistake, and any one who has any idea of the completeness of the data received

from masters of vessels for use in preparing the Pilot chart, must realize how true is the clearly indicated evidence, that there is little or no ice south of the 42d parallel, and certainly none whatever south of 40° 30' north. Moreover, the further north the more numerous, solid and massive are the icebergs ; and the further south the fewer, smaller and less compact.

Ensign Hugh Rodman, U. S. N., on duty in the Hydrographic Office, who has made a study of icebergs and field ice in the North Atlantic, says : \* “ The movements of the ice depend in a great measure upon the various currents that traverse the ocean, as well as upon a great variety of other forces, and little can be said with any degree of definiteness as to the probable movements of ice beforehand. Hundreds of vessels have been lost from ignorance of the local path of the ice, and many are damaged on the same account. There is great difference in the rates at which bergs travel. One may reach the southern waters the same year in which it is produced, while another may be several years going the same distance. The ice fields are a great obstacle to their progress, smashing them up, and causing their disintegration. They are very brittle, and sometimes a sharp blow of an axe or the concussion of the report of a cannon will demolish one. Quite often they have long outlying spurs projecting under the surface of the water, but as a rule they are nicely balanced and are quite apt to tumble over if disturbed. They are detected in fogs by their apparent blackness, but more often by the echo which they throw off from any such sound as a fog horn or a whistle.”

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\* Address before the National Geographic Society.



It has been the desire of the Hydrographic Office to commence the publication of a Pilot chart of the South Atlantic and west coast of South America, and as a basis of the work, it has in preparation in connection with the reports of the United States Eclipse Expedition to the west coast of Africa, a set of daily weather maps of both oceans, from October, 1889 to May, 1890, the entire period of the cruise of the *Pensacola*. "The scheme determined upon,\* consists in the preparation of a weather map for each day at noon, Greenwich mean time, from October 1, 1889, to May 31, 1890, for the entire area between lat.  $70^{\circ}$  N. and  $60^{\circ}$  S., long.  $20^{\circ}$  E. and  $100^{\circ}$  W. In addition to the Greenwich noon observations that are kept regularly for this office by nearly two thousand voluntary observers, it is earnestly desired that other navigators of these waters within the limits of time and place mentioned forward such data from their log-books as may be useful in this connection, selecting those observations that come nearest to noon, G. M. T., and stating as many details as possible regarding, wind, weather, state of the sea, and velocity and set of currents. In the case of a storm, hourly observations about the time of the lowest barometer will be very useful. Data from land stations are also very important. To make this great undertaking a success, there must be cordial co-operation amongst the nations interested in the meteorology of this vast area, and amongst navigators of every nationality. It is intended to publish the results in such form, and with such wide distribution as well to repay every one who contributes to its success.

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\* Note on Atlantic Pilot chart for June.

METEOROLOGY, ETC.—About twenty five members were present at the annual meeting of the American Meteorological Society in this city. Dr. B. A. Gould presided, and Mr. O. H. Tittman of the Coast Survey was Secretary. The papers read were: Instruments of valuation, by S. Dana Horton; Gold and Silver as measures of value, considered from a metallurgical standpoint, by Prof. T. Egleston; Remarks on the nomenclature of electrical units, by Prof. T. C. Mendenhall; and a supplementary paper on the same subject by Prof. Crocker of the National Association of Electricians.

The American Meteorological Society at a recent meeting held also in this city, adopted resolutions favoring the recognition of the eminent services of American electricians by perpetuating their names in the nomenclature of electrical units. It will be proposed at the Electrical Conference to be held in America in 1892 that the name of Joseph Henry—or some modification of it—shall be given to the unit of self-induction, “he having been the first to investigate that phenomenon and his investigations having been more complete than those of other electricians before or since.”

The friends of the late Joseph Henry are urging upon Congress a gift \$25,000 to his family in recognition of gratuitous services for many years as a valued member of the Light-House Board. Professor Henry's investigations, and experiments, as it is well understood, have saved hundreds of thousands of dollars to the Government. One of the most modest of men, he freely gave the results of his investigations to science and to the world. Letters patent would have secured him wealth in abundance and liberal competence to his family, but instead, he left

only the heritage of his great name and a moderate sum presented to him by his admirers a few years before his death. If the proposed gift were ten times as great, it would be but a small percentage of the gain to the American people from the free use of his scientific discoveries.

ECLIPSE EXPEDITION.—An Act was passed by Congress on the 2d of March, 1889, authorizing the Secretary of the Navy "to use \$5,000 to defray the expense of sending a scientific expedition to the west coast of Africa to observe the total eclipse of the sun which will occur on the 22d of December, 1889." March 26th the Chief of the Bureau of Navigation appointed a Board consisting of Capt. R. L. Phythian, U. S. Navy, chairman, and Professors Simon Newcomb and Asaph Hall, U. S. N., to devise a plan and make recommendations.

In accordance with the report of this Board made May 28th, the Department organized the expedition in two parties,\* and tendered the appointment of chief of one party to Mr. J. A. Rogers of Washington, and of the other to Professor David P. Todd of Amherst College, Mass. Mr. Rogers resigning his appointment, the Secretary of the Navy appointed Professor Todd to the charge of the expedition. Various new instruments were immediately constructed and other apparatus was obtained from the U. S. Naval Observatory, from the observatories and laboratories at Clark, Harvard, Johns Hopkins and Yale Universities, from the Massachusetts Institute of Technology, from the U. S. Coast and Geodetic Survey, the Army Signal Service, the National Museum, from the observatories at Allegheny, and Am-

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\* See Am. Geog. Society's BULLETIN No. 3, 1889—The Eclipse, 1889.

herst, Columbia and Princeton Colleges, from the U. S. Nautical Almanac Office and the U. S. Fish Commission ; besides a large complement of important instruments by private loan. The apparatus embraced all the instruments necessary for the photographic registration of the partial phases of the eclipse, and for the complete photographic, spectroscopic, photometric and polariscopic study of the sun's corona.

The Secretary of the Navy detailed the *Pensacola* to convey the members of the expedition to the west coast of Africa and return them to the United States. The vessel sailed from New York on the 16th of October, 1889, and returned on the 23d of May, 1890.

The composition of the expedition was as follows :

David P. Todd, Director,	<i>Astronomy.</i>
Cleveland Abbe,	<i>Meteorology.</i>
Frank H. Bigelow,	<i>Astronomy.</i>
Arthur H. Brown,	<i>Natural History.</i>
W. Harvey Brown,	<i>Natural History.</i>
John E. Carbutt,	<i>Photography and Chemistry.</i>
Héli Chatelain,	<i>Languages.</i>
Herman S. Davis,	<i>Astronomy.</i>
L. Harold Jacoby,	<i>Astronomy and Geodesy.</i>
Eben J. Loomis,	<i>Botany and Ornithology.</i>
C. A. Orr,	<i>Anthropology.</i>
Erasmus D. Preston,	<i>Terrestrial Physics.</i>
Edgar J. Wright,	<i>Photography.</i>

Daniel H. Barlett.  
George F. Flint.  
M. O'Conner.  
G. E. Van Guysling.

Professor Alexander Agassiz of Cambridge, and Dr. William J. Holland of Pittsburgh, were appointed by the Secretary of the Navy members of the expedition, but were obliged to decline the appointments.

The itinerary included the Azores, Cape Verdes, Sierra Leone, Gold Coast, São Paulo de Loanda, Cape Sedo, Cape Town, St. Helena, Ascension, and Barbadoes. There was not a stormy day from the beginning to the end of the voyage.

The preparations for the total phase of the eclipse were very elaborate, "nothing short of complete automatic operations of all the photographic instruments." But totality was completely clouded under, and, as Professor Todd says,\* "instead of a fine accumulation of photographic data, I have only the gratification of having shown it to be practicable in the future for one eclipse observer to operate an indefinite amount of photograph apparatus quite as readily as, and with greater certainty than, he would have attended to only two or three cameras by hand heretofore." It was cloudy also at Cabiri, Cunga, and Dondo where auxiliary observers had been stationed, as well as at Cazengo, Oeiras, Muxima, Kakulu and Bom-Jesus. Observers on the *Pensacola*, 15 miles out at sea in the path of the central eclipse obtained no better results. No photographs of the corona were secured.

Numerous observations were taken from Cape Sedo where the weather was clear for a portion of the time. The direct view with the photo-heliograph of 44 feet focus proved an entire success. Each of the 22 inch circumpolar plates has ten images of the sun in eclipse, seventy of them being taken before the middle, and ten after totality.

While the main eclipse party was established at Cape Sedo, naturalists and anthropologists were in the in-

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\* *Nature*, May 1, 1890.

terior. Physical measurements were taken among several tribes; collections of folk-lore, fetishes and mind-products were made, and general information gathered. Both naturalist and anthropologist found the outlook so promising at the Cape that they applied for discharge from the expedition in order to continue the work on the peninsula. The naturalists of the U. S. National Museum were active in making collections at all ports. M. Chatelain remained at Angola to gather linguistic and ethnological material for various works he has on hand.

The researches of Professor Abbe, the meteorologist of the expedition, prosecuted with improved means and under rare conditions on sea and on land, are expected to produce most important results, and perhaps revolutionize some branches of that science.

In gravity research Mr. Preston, of the Coast Survey, swung the Pierce pendulums at Loanda, at Cape Town, at St. Helena, at Ascension, at Barbadoes and at Bermuda.

The early literature of this expedition bids fair to excite the cupidity of bibliomaniacs at least, inasmuch as the several works were printed in very limited quantities, and, with one or two exceptions, on board the *Pensacola*. But in order to preserve the record, and show collectors and others what they cannot have, a list is subjoined. The printers on the *Pensacola* were not idle.

Bulletin No. 1.—General. October 17, 1889.

“ No. 2.—Meteorological, by Cleveland Abbe. October 18, 1889.

“ No. 3.—Fish of the Congo Basin, by Theo. Gill. October 21, 1889.

“ No. 4.—The Total Eclipse, by D. P. Todd. Nov. 1, 1889.



- Bulletin No. 5.—Bibliography of Ki-Mbundu, by Héli Chatelain. November 5, 1889.
- " No. 6.—Water spouts, by Cleveland Abbe. November 7, 1889.
- " No. 7.—Provisional list of animals of Angola and vicinity, by F. W. True. Nov. 15, 1889.
- " No. 8.—Eclipse photography, by Frank H. Bigelow. Nov. 20, 1889.
- " No. 9.—Instrucções para observação do eclipse total do sol, por D. P. Todd. Traduzidas por H. Chatelain. December 10, 1889.
- " No. 10.—Suggestions for amateur observers, by Cleveland Abbe. Dec. 10, 1889.
- " No. 11.—Terrestrial physics, by E. D. Preston. Dec. 24, 1889.
- " No. 12.—The total eclipse, by D. P. Todd. Dec. 31, 1889.
- " No. 13.—Localities of scientific interest in St. Helena, by Cleveland Abbe. March 19, 1890.
- " No. 14.—Bibliography of Angola and other parts of Africa, by E. J. Loomis. April 15, 1890.
- " No. 15.—The law of distribution of the actinic light of the solar corona, by Frank H. Bigelow. April 19, 1890.
- " No. 16.—A logarithmic system of sensitometer number, by Frank H. Bigelow. May 1, 1890.
- " No. 17.—The automatic eclipse apparatus, by D. P. Todd. May 15, 1890.

U. S. BOARD ON GEOGRAPHIC NAMES.—In January of this year the Hydrographer to the Bureau of Navigation of the Navy Department, finding no end of complications resulting from the variety of forms of orthography and nomenclature of geographic names of the same place, on Government charts and in official publications, communicated to the Superintendent of the U. S. Coast and Geodetic Survey, his desire to bring about a unified practice in the work of the two offices in the use of geographic names in future publications regarding Alaska. The Superintendent cordially responded, and Lieutenant Clover, the assistant hydrographer, was appointed to arrange with Professor Mendenhall plans to consum-

mate this work. It was found that of the entire vocabulary of Alaskan names, there was hardly a word that did not admit three or more forms of spelling, and frequently as many of nomenclature in official publications. It was felt that results would be much more general if the Geological Survey and Smithsonian Institution came into the agreement. In answer to a note from Professor Mendenhall, favorable replies were received from the Director of the Geological Survey and the Secretary of the Smithsonian Institution, and representatives were sent. From the outset the general opinion expressed was that there was need of unification in geographic names in all sections of the country as well as in Alaska, and that it would be very beneficial should a board of representatives from different bureaus, or departments, consider all geographic names throughout the country that are at variance, and decide upon a common orthography and nomenclature that would be acceptable to all departments. The need of such an agreement was so apparent and so strongly felt by heads of offices and bureaus directly interested, that a mixed board has come into existence, representing by appointment the various departments interested.

The Board as at present constituted consists of:

Prof. T. C. MENDENHALL, Superintendent U. S. Coast and Geodetic Survey, *Chairman*.

Lieut. RICHARDSON CLOVER, U. S. N. Hydrographic Office, Navy Department, *Secretary*.

Capt. HENRY L. HARRISON, U. S. N. Light-house Board, Treasury Department.

Capt. THOMAS TURTLE, U. S. Engineers, War Department.

Prof. OTIS T. MASON, Smithsonian Institution.

Mr. HERBERT G. OGDEN, U. S. Coast and Geodetic Survey.

Mr. HENRY GANNETT, U. S. Geological Survey.

Mr. PIERSON H. BRISTOW, Post Office Department,  
Mr. MARCUS BAKER, National Geographic Society.

The composition of the Board is conservative to a marked degree. Every member of it has eminent qualifications for the position. It will create no surprises or sensations, but, acting simply as referee, will dispose of practical questions in such a manner as to carry the indorsement of the intelligent public.

The report of the committee on organization as amended and approved by the Board, April 23, 1890, states :

"It is the sense of the committee appointed to consider method and scope of work and organization of 'The United States Board on Geographic Names,' that the primary object of the Board should be to bring about consistency and uniformity of practice in the geographic publications of the various departments of the Government. We recommend that the Board should at first assume the simple character of a board of reference for intelligently disposing of such practical questions within its scope, as may be referred to it. As the usefulness of the Board will depend largely upon the quality of its work, it appears to be essential that rules should be adopted to govern certain classes of cases in orthography and nomenclature, at the earliest practicable date ; we do not consider it advisable, however, that such rules and principles should be promulgated until their fitness has been fully tested. It is thought that the Committee might advantageously report at an early date, on the use of capitals, the use of possessives and on punctuation."

The officers of the Board consist of a Chairman, a

Secretary and an Executive Committee of three members. The Secretary is required to keep a record of the decisions rendered and the action of the Board on cases considered. He is also to notify each member of the Board in writing of the substance of every question referred to the Executive Committee for investigation. In cases wherein this Committee comes to unanimous agreement, the rules require that it shall file a statement of its conclusions with the Secretary. The tenor of this paper, together with the question under consideration, shall be transmitted by the Secretary to each member of the Board, and if after five days have elapsed no dissenting opinion shall be filed in reply thereto, the conclusions reached by the Committee shall be announced as the decision of the Board. In case, however, of a dissenting opinion being filed, the conclusion reached by the Committee shall not be announced, and the question shall be submitted to the Board for its action. The affirmative vote of a majority of all the members of the Board shall be required in the final decision of any case in Board meeting.

The designations of membership on this Board from the Executive Departments are all made by heads of each department. The following circular is an announcement by the Secretary of the Treasury :

CIRCULAR. GEOGRAPHIC NAMES.

1890. Department No. 28.  
Light-house Board, No. 2.

TREASURY DEPARTMENT,  
WASHINGTON, D. C., May 1, 1890.

*To Officers of the Treasury Department :*

Capt. H. L. Howison, U. S. N., member of the Light-house Board, is also a member of the United States Board on Geographic Names, and

has been designated by that Board as the representative from the Treasury Department.

The United States Board on Geographic Names is composed of representatives from Government departments interested in such matters, and is formed for the purpose of discussing and deciding as to the proper orthography and nomenclature of geographic names; to decide as to the adoption of names for geographic points and places, when such names are in dispute, either as to the correct names to be used, or as to the proper spelling of such names; also to decide as to suitable names for points or places not yet named, and as to changing names, which are now, or may be, clearly improper or unsuitable.

The officers of this Department having such questions arising in their several offices are requested to refer them to this Board for its action and decision.

Communications for the Board should be addressed to Lieut. Richardson Clover, U. S. N., Secretary United States Board on Geographic Names, Hydrographic Office, Navy Department, Washington, D. C.

WILLIAM WINDOM,  
Secretary.

Among the many papers already submitted to the Board was a list from the U. S. Hydrographic Office containing 177 disputed names in Alaska, citing different authorities, all official excepting one. Take a few as examples :

NAME.	AUTHORITY.
Behring.	C. S. Coast Pilot of Alaska. Hy. O. chart No. 68. B. Ad. chart Nos. 2172 and 2558. Lippincott's Gazetteer.
Bering.	C. S. charts Nos. 960, 900. B. Ad. charts Nos. 278, 2460. C. S. Pacific Coast Pilot.
Behrings.	Hy. O. chart No. 528. C. S. Pacific Coast Pilot.
Amoughta.	Hy. O. chart No. 68.
Amukhta.	C. S. charts Nos. 960, 900. B. Ad. charts Nos. 260, 278, 2172, 2460, 2558.
Amoukhta.	Hy. O. chart No. 528.
Amuchta.	C. S. Coast Pilot of Alaska.

NAME.	AUTHORITY.
Becharoff.	C. S. chart No. 960.
L. Bochonoff.	Hy. O. chart No. 68.
Rochanoff Lake.	B. Ad. charts Nos. 2172, 2460, 278.
Oogahik.	Hy. O. chart No. 68.
Ugashik.	C. S. charts Nos. 900, 960.
Sulima.	B. Ad. charts Nos. 2172, 2460.
Stikine.	C. S. charts Nos. 900, 701, 960. B. Ad. chart No. 787.
Stikeen.	Hy. O. chart No. 527.
Lynn Canal.	C. S. charts Nos. 900, 701, 960.
Lynn Channel.	B. Ad. charts Nos. 787, 2172. Hy. O. chart No. 527.
Pumice Stone Bay.	Hy. O. chart No. 68.
Moorovskoy Bay.	C. S. chart No. 900.
Redoubt Volcano.	C. S. chart No. 900.
Burnt Mount.	B. Ad. chart No. 787.
Chinchinbrook.	Hy. O. chart No. 68. C. S. chart No. 900.
Hinchinbroke.	Hy. O. chart No. 68. B. Ad. chart No. 787.
Bering Haven.	C. S. chart No. 960.
Controllers Bay.	B. Ad. chart No. 278. Hy. O. chart No. 527. C. S. chart No. 702.
Controller Bay.	B. Ad. chart No. 787.
Comptroller Bay.	B. Ad. chart No. 2558.
Cape Yaktaga.	C. S. charts Nos. 900, 960.
Cape Yaktag.	Hy. O. chart No. 527. C. S. charts Nos. 701, 702.
Cape Yakaio.	B. Ad. chart No. 278.
Cape Yakiao.	B. Ad. chart No. 787.
Andreafsky.	Hy. O. chart No. 68.
Andreieffski.	C. S. charts Nos. 900, 960.
Andreievsky.	B. Ad. charts Nos. 2172, 278.
Andreaivsky.	B. Ad. chart No. 2460.
Golovine.	Lieut. Stoney's map. B. Ad. charts Nos. 2460, 2172. C. S. chart No. 960.
Golovin.	C. S. chart No. 900.
Golovnin.	B. Ad. chart No. 260. C. S. chart No. 900.
Golovain.	B. Ad. chart No. 278.



NAME.	AUTHORITY.
Golofnin.	Lieut. Stoney's map. B. Ad. charts Nos. 2172, 2460.
Tchegoula.	Hy. O. charts Nos. 68, 528.
Chegoula.	B. Ad. charts Nos. 2460, 2172, 260, 278. C. S. charts Nos. 960, 900.
Chugnel.	C. S. Pilot of Alaska,
Andreanowsky.	Hy. O. charts Nos. 68, 528.
Andreanoff.	C. S. charts Nos. 900, 960. B. Ad. charts Nos. 278, 2460, 2172.
Andreanov.	Lippincott's Gazetteer.

It is not expected that the Board will announce any decisions until the autumn, when it shall have had time to digest principles for guidance, and to consider the large amount of subject matter now in the hands of the committee.

ALASKA.—An exploring expedition, under the auspices of the National Geographic Society, left this city early in June for Alaska. The party is in charge of Israel C. Russell, who traversed the Yukon region in 1889, and Mark B. Kerr. Both gentlemen are connected with the United States Geological Survey. They will go to the almost unknown country northward of the St. Elias Alps to study, map out and photograph the glacial streams of that region. The steamer of June 14th will convey them from Seattle, and the U. S. S. *Pinta* will be at their disposal upon arriving at Sitka, for conveyance to Yakutat Bay, which will be the starting point inland. A detour thence of about fifty miles, crossing the range of mountains at a low point, will bring the party within reach of the ice fields.

It is not denied that an attempt will be made to reach the 19,500 feet summit of Mount St. Elias if the condi-

tions are found to be more favorable than those known to exist on the south side. Doubts have been entertained as to the advisability of sending out an expedition for glacial work so late in the season, but after an extended discussion and hearing the testimony of naval officers and others who have had large arctic experiences, the conclusion was reached that the month of September was favorable for mountain climbing. At the same time the explorers expect to make such good use of the intervening time in studying the glacial system of Alaska, about which so little is known, that if they should fail, as all others have, in reaching the coveted summit this year, they will not feel that the trip has been useless. The details of the expedition have been well planned.

Under the auspices of the Case School of Applied Sciences, of Cleveland, Prof. H. F. Reed is also engaged in physical investigations in connection with the glaciers of Alaska. With his usual courtesy the Superintendent of the U. S. Coast and Geodetic Survey has extended valuable facilities to Prof. Reed.

The English-Eskimo and Eskimo-English Vocabulary,\* compiled by Roger Wells, Jr., U. S. N., and John W. Kelly, interpreter attached to the U. S. S. *Thetis*, contains a greater number of words than any similar work. The Bibliography of J. C. Pilling has between six and seven hundred titles of books wholly or in part relating to these languages, but in all that number is found but an exceedingly small list of available vocabularies, and of these none are readily accessible. Dr. Barton's Vocabulary, 1798, and Capt. John Washing-

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\* Circular of Information, No. 2, 1890, 72 pp., U. S. Bureau of Education.

ton's, 1850, and a little English-Aleutian Dictionary, prepared by Stephen N. Buynitzky for the Alaska Commercial Company in 1871, are out of print, so that the most accessible work is that of Lieut. P. H. Ray, found in his recent report of the International Polar Expedition to Point Barrow (1885). This report contains about seven hundred words and three hundred and seven phrases. Mr. L. M. Turner, who has had large experience in Alaskan exploration, has in preparation a vocabulary of about twelve thousand words. The Wells-Kelly vocabulary has eleven thousand three hundred and eighteen English and Eskimo words. It was prepared at the suggestion of Com. C. H. Stockton of the *Thetis*, and is the result of four years' (1884-'89) study and practice, one year with the natives alone, when no English word was heard. It was rewritten and corrected every four months. Perhaps not the least interesting and valuable part of this work is that relating to the Asiatic Eskimo, or, rather, the American Eskimo, who are settled upon the Asiatic side of Bering Straits.

The vocabulary is preceded by an interesting and original ethnography of the Eskimo in Alaska and Siberia, by Mr. Kelly, who has spent several years in actual communication with and study of the tribes. The growing importance, scientific, commercial and political, of this territory enhances the value of every original research, however brief.

COLORADO CAÑON.—Col. Robert Stanton, of the Denver expedition now exploring the comparatively unknown regions traversed by the Colorado River gives out a partial account of the journey down the wild

stream from the head of the Granite Gorge of the Grand Cañon to the mouth of Diamond Creek. The narrative is so graphic and yet concise that it will afford pleasure to those who read it. Of that portion of the Granite Gorge from its head to Bright Angel Creek, Colonel Stanton has this description in his note book under date of February 7th :

“The cañon is growing more and more picturesque and beautiful the further we proceed. The Granite has lost its awful and threatening look, and slopes back in beautiful hillsides of variegated black, grey and green. Above this, next to the river, is a stratum of dark sandstone cut into horizontal layers, standing in an almost perpendicular wall, jutting out in places to the edge of the Granite and studded all over with points standing out in the air : darker in color than those behind them and the top edge cut into smaller points and crevices through which the light shines, giving a rough beaded appearance. As we look down the river or up a low side cañon, with the placid water between its polished walls of black and grey and green for a foreground, there rises above the dark sandstone tier upon tier, bench upon bench, terrace upon terrace, stepping back further and further and higher and higher, and in their immensity of height and proportions seeming to tower almost over our heads. First above the darker sandstone come the flattened slopes of the lime and mineralized matter in horizontal layers of yellow, brown, white, red and green. Then rise sheer walls of stained marble 1,000 feet or more, the lower portions yellow, brown and red, and the coloring of red growing brighter as it nears the top. Above this smaller benches of mar-

ble, at the top of each a little *mesa* covered with green grass and bushes, and above these a dozen or more terraces of scarlet and flame-colored sandstone, stained on their outer points with black, and the little benches between them relieved by the bright green of the greasewood and bunch grass, the whole covered with, perhaps, a couple of thousand feet of the lighter grey, yellow and white sandstone ledges, capped by pinnacles and spires, turrets and domes in every imaginable shape, size and proportion, with all their slopes covered and their tops fringed with pine, cedar and pinion trees, whose bright green stands out in bold relief against the flaming colors of the sandstone and the banks of pure white snow that cover the top and have run down into the many gulches along the sides.

“On many of the long stretches where the river can be seen for several miles the picture is one of grandeur and beauty. Grand with its walls of bright colors towering 2,500 feet overhead, beautiful in its long calm green slopes, with the quiet waters sparkling in the sun at their foot. From the mouth of the Kanab Wash for about twenty miles down is perhaps the narrowest and deepest part of the great inner gorge. At the bottom of the gorge is from 150 to 200 feet wide and the river runs between vertical walls, and fills the whole space from wall to wall. The walls of this portion of the cañon rise above the water about 3,000 feet, the benches are narrower and the vertical cliffs between the benches higher than in any other section. From one end to the other of this section there is a bench about 50 feet above high water, running almost parallel with the grade of the river, of solid marble wide enough to

build a four-track railroad upon, and not interfere with the perpendicular walls above or the river below."

GEOGRAPHICAL SURVEYS.—The geographical report of Capt. George M. Wheeler, Corps of Engineers, U. S. A., being vol I. of the Report upon geographical explorations and surveys west of the 100th meridian, has been printed (4to. 780 pp., 38 plates, 3 maps). This report was substantially brought to a close in 1879, but not presented for publication until 1887. Volumes 2 to 7 and a supplemental volume were printed between the years 1875 and 1879. About one-third of the present volume is occupied with descriptions of the areas covered by surveys west of the 100th meridian under the direction of the War Department. A valuable chapter entitled "Considerations upon National Government Land and Marine Surveys" is followed by a very important memoir upon the voyages, discoveries, explorations, and surveys to and at the west coast of North America and the interior of the United States west of the Mississippi River from the year 1500 to 1880. This memoir embraces :

1. An account of geographical discovery on the west coast and interior from 1500 to 1800, with a chronological list of expeditions. The "list" was submitted to the late James Carson Brevoort, Rev. Dr. B. F. De Costa, Henry Harrisse, Professors Fischer and Ruge, and revised in accordance with their suggestions. It is followed by photo-lithographs of tracings of certain old maps, with notes, intended to illustrate the progress of geographical information as to the North American continent during this period. The maps reproduced are :

The Island of Antilia, by Benincasa, 1463 (one of



the first maps indicating larger countries to the west of Europe).

America, from Ptolomæus, edit. Romæ, 1508.

America, from a globe in Frankfort, about 1520 (believed to be the first map upon which the name "America" appears).

North America, by Abraham Ortelius, 1589.

North America, by Zattieri, 1566 (reputed to be the first map upon which the Straits of Anian, between Asia and America appear).

America, from "Hondius," ed. 1609.

North America, from Purchas, 1625 (constructed to prove the possibility of a north-west passage).

America, by F. DeWit, Amsterdam, about 1670.

North America, by John Senex, London, 1710.

North America, by Edward Wells, 1722.

North America, by Thomas Jeffreys, 1782.

2. An epitome of Lieut. G. K. Warren's memoir, giving a brief account of each of the English expeditions since 1800 (to 1857), with added notes.

3. An account of explorations and surveys from 1857 to 1880.

A very large amount of valuable information nowhere else accessible is brought together in this volume, which would have been given to the world much earlier but for the prolonged illness of the author. It is the key to the whole history of U. S. Government surveys, and its usefulness is further augmented by an index of subjects and an index of names.

IRRIGATION.—The advance sheets of the tenth annual report of the United States Geological Survey, by J. W.

Powell, Director, contain the first annual report upon irrigation for the year ending June 30, 1889.

It is stated that the area of the arid region is about 1,300,000 square miles—one-third of the entire country. Major Powell interprets the law governing the survey, “not as authorizing the construction of works of irrigation, but as directing a comprehensive investigation of prevailing conditions, the whereabouts of irrigable land most eligible for redemption, and its segregation for homestead settlement and canal sites; the seepage; the evaporation; the vested rights, and how to maintain them; and, generally, the most economical methods of bringing the land and water together.” He has been led to these conclusions from a careful consideration of the statutes and the executive correspondence preliminary thereto, and from examination of the reports made by committees of Congress, and the Congressional debates on the subject.

Acting under these convictions he submitted to the Secretary of the Interior for his approval, which it received, a plan for the survey, which is divided into three parts:

- I. The topographical survey.
- II. The hydrographic survey.
- III. The engineering survey.

The topographic work consists of surveys delineating the topographical features of the country, the areas of all drainage basins, the courses of streams, the situation of lakes, springs, and other bodies of water; the positions of possible reservoir sites, the location of dams and canal lines, and the altitude, position and general character of all irrigable lands.

The hydraulic and engineering work consists of the measurement of rain-fall and the study of general meteorology, measurement of river-flow, evaporation, and matter carried in suspension by water ; the ascertainment of the duty of water, and the determination of the mode and cost of construction of dams and canals, and of the areas and contents of reservoirs.

It is not necessary here to advert to the numerous intricate problems—present and future—involved in an undertaking of this magnitude.

Work has been prosecuted in Montana, Utah, Colorado, New Mexico, Idaho, Nevada and California, with the following results :

Total area mapped out, square miles.....	43,530
Total area surveyed,       “       “       .....	21,766
Reservoir sites selected for segregation.....	127
Reservoir sites surveyed.....	34
Canal sites surveyed.....	4
Total segregations of irrigable lands, acres.....	30,055,120

With succeeding appropriations work will be continued in these localities and carried on in North and South Dakota, Nebraska, Kansas, Indian Territory and Oklahoma, Texas, Wyoming, Arizona, Washington and Oregon.

The special committee of the United States Senate on the irrigation and reclamation of arid lands, of which Senator Stewart, of Nevada, is the chairman (the other members being Senators Allison, of Iowa ; Hiscock, of New York ; Plumb, of Kansas ; Gorman, of Maryland ; Jones, of Arkansas, and Reagan, of Texas), has submitted reports (majority and minority), accompanied by testimony, maps and drawings, the whole forming several volumes, and by far the largest and most important

contribution to the American literature of irrigation yet made.

While the entire committee is in sympathy with irrigation, the views of the majority and of the minority as to the methods of accomplishing the work are not in harmony, and an active controversy has resulted. It is claimed by the majority (Mr. Stewart and others) that *topographic* survey of the arid regions is unnecessary, slow and expensive ; that it be discontinued. That the hydrographic branch should be turned over to the Signal Service ; and, as they differ with the director as to the method of conducting the survey, that the work be placed under the direction of a Commissioner of Irrigation, subordinate to the Department of Agriculture.

It is the opinion of these gentlemen that in order to specify irrigable lands it is only necessary that irrigation engineers first go over the country to find out what lands are irrigable. They must identify what townships and sections include the irrigable lands, represent them on a transcript of the Land Office map, and report them, section by section, to the Land Office. That topographic maps are of some convenience in the way of general information of a geographical character, but that they can be dispensed with without any serious inconvenience. That the maps already in existence, viz. : Land Office surveys, railroad surveys, and the topographical surveys of Wheeler, Hayden and Powell furnish sufficient information for the guidance of the engineers.

But by far the most important recommendation of the majority is for the repeal of that portion of the section of the Act of October 2, 1888, which provides that "all

the lands *made susceptible of irrigation* by reservoirs, ditches, or canals shall be reserved from sale as the property of the United States, until provided by law."

The bill submitted by the majority reserves the unappropriated waters of the lakes and rivers on the public lands for such beneficial uses as shall be determined by the States and Territories in which such waters are situated, and places them under the control of the States and Territories, subject only to the paramount authority of the United States. It reserves the right of way for ditches, canals, and other hydraulic works for the use of irrigation, and allows the flowing waters to be diverted from the natural beds of streams upon the arid areas. Access is also reserved over the public land, west of the ninety-eighth meridian west, to all natural waters on the public lands for man and domestic animals. It also reserves to the United States the adjudication of all questions and disputes that may arise in relation to the storage, conservation, flowing and distribution of all natural waters, flowing or standing, located within or passing through the boundaries of two or more States and Territories within the area described.

The minority of the committee (Messrs. Reagan, Gorman and Jones), recommend Congressional action which is opposed to that recommended by the majority. They are of opinion that the present irrigation survey is performing its duties in compliance with law, and in an efficient and thorough manner, and that the work under it should proceed at a reasonable rate of progress until it is finished. It is estimated that survey will cost \$7,000,000, but that in making the maps it will save \$4,000,000 to the Geological Survey. Thus the real

cost of the irrigation survey will be but \$3,000,000 over and above the cost of the geological survey. The survey needed for the sub-humid region of the Great Plain is purely a geological survey based on topography. The topographic work is necessary, economical and legal, and is believed to be the proper basis for a hydrographic survey.

The creation of a new bureau of irrigation in the Department of Agriculture is considered unnecessary and unwise, and reasons are advanced why the hydrographic branch of the work should not be turned over to the Signal Service.

They claim that the legislation already accomplished by the Act of October 2, 1888, which reserves the sites for irrigating works in the hands of the general government, and reserves the lands made susceptible of irrigation thereby from homestead settlement is wise, and should not be repealed. The desert-land laws and the pre-emption laws and the timber-culture laws which are in effect repealed by that act, should not again be made operative, for by their agency large tracts of land have heretofore been aggregated in the hands of wealthy individuals and corporations. That the bill reported by the majority of the committee is in the interest of the great cattle companies that pasture their animals on the public domain, and opposed to the interests of the farmers making homesteads on the lands. That the land should be held for settlers, and not for speculative syndicates and companies who would sell or rent the broad acres at their own price.

The Constitutional Convention of Idaho in August 1889, memorialized the Secretary of the Interior as fol-



lows : " Whereas, the Government of the United States has taken steps towards redeeming the arid lands of the West . . . . and

Whereas, for the purpose of establishing a thorough system of storage reservoirs, canals, and irrigating ditches, engineering parties are making surveys for this purpose ; and

Whereas, it is learned that the plans of the Government are threatened to be thwarted by speculators having men to follow up these surveys to make filings on lands, reservoirs, and canal locations ;

*Resolved*, By the Idaho Constitutional Convention, now assembled at the capital of said Territory, having the good of the general public and the good of the people of Idaho, with the prosperity of the Territory at heart, do hereby memorialize the Department of the Interior to take such action at once as will remedy the evils which threaten this fair Territory in the manner outlined in this memorial."

This memorial was the basis of the memorable circular from the General Land office under date of August 5, 1889, and sent to registers and receivers of the United States district land offices, which after citing the provisions of the Act of October 2, 1888, promulgated the following order :

" You will therefore immediately cancel all filings made since October 2, 1888, on such sites for reservoirs, ditches, or canals for irrigating purposes and all lands that may be susceptible of irrigation by such reservoirs, ditches, or canals, whether made by individuals or corporations, and you will hereafter receive no filings upon any such lands."

The features of the minority's bill are : 1. Provision for a survey of the arid lands into natural irrigation districts. 2. The segregation of the irrigable lands. 3. Lands already irrigated shall be declared irrigable for the purposes contemplated. 4. Certain irrigation works shall be constructed only on sites designated and reserved therefor, in order to protect water rights and to conserve the waters for beneficial purposes. 5. The division of the waters among the districts. 6. Organization of districts situated in two or more States and Territories. 7. Non-irrigable lands shall remain in the possession of the Government as forage and pasturage reservations and catchment areas for irrigable lands. Irrigable lands to be disposed of to homestead settlers in tracts not greater than 80 acres. 8. The attachment of water rights to the homesteads of the irrigable lands. 9. Unauthorized irrigation works unlawful. 10. Plan for the organization of irrigation districts. 11. Laws and rules for the use of the waters belonging to the districts and for the protection and use of the forests and pasturage. 12. General legislation by States and Territories relating to the use of the waters, forests and pasturage. Methods by which the capital for the construction of irrigation works may be obtained. 13. States to provide boards of irrigation commissioners to supervise and approve works authorized and contracts made by district commissioners.

The general effect of this bill is to turn over the control of irrigation to the States and the districts, the general statutes to be made by the States, and the specific rules by the districts. Therefore, it will accomplish local self-government in relation to irrigation and the forest and pasturage administration. It relieves the general gov-

ernment of all subsequent legislative and administrative duties, except only to complete the irrigation survey of the whole, and the linear survey of the irrigable lands, and also to administer the homestead laws, coal-land laws, mining-land laws, and town-site laws through the General Land Office.

There has as yet been no Congressional action on either bill. Meanwhile the full amount (\$750,000) asked by the directors for work of the survey under existing plans, for the fiscal year 1890-91, has been favorably reported and passed upon in the House of Representatives.

INTERCONTINENTAL RAILWAY.—Of perhaps greater importance than anything else considered by the recent conference of American nations was the international railroad idea, and no other matter which was before the Conference has been advanced to such a position. The report of the committee on railway communication was not finally acted upon until late in April. On the 19th of May the President of the United States communicated this report to Congress with a special message, and on the 29th of the same month the Committee on Foreign Affairs of the House of Representatives reported a bill "to provide for a survey and to encourage the construction of a continental railway to connect American nations," embodying some of the provisions recommended by the Conference; that is to say, an invitation to the several South American governments to co-operate with the Government of the United States in the appointment of an international commission of engineers to examine the possible routes and report their length, cost and advantages, and make proper surveys for a continental railway to connect the United

States with other republics of the American continent ; each government to pay its proportionate part of the expense of the survey.

In opening railways between the Atlantic and Pacific oceans, the United States and Canada and other countries have performed works of equal or greater magnitude than will probably be required to establish unbroken railway communication with all the republics south of us.\* The building of the Baltimore and Ohio and Pennsylvania railways over the Allegheny mountains were greater undertakings than that of an intercontinental railway would now be. The most difficult portions of a railway to South America will not exceed those of the Mexican railway from Vera Cruz to the City of Mexico, or those of the Panama railway across the isthmus. Much has already been accomplished in the different Spanish-American countries in building parts of the proposed through line, which, when combined, will reduce the entire work and distance almost one-half ; so that not only can continuous railway communication with those countries be considered feasible, but also in a fair way to be realized. From the southern terminus of the railroads now in operation in Mexico to the northern terminus of the Argentine system the distance is estimated at 4,900 miles. In this distance 230 miles are now in operation ; of the remaining distance about 1,800 miles are already under survey and construction, which, when completed, will leave about 2,870 miles to be located and constructed in order to complete the line that will eventually unite the republics of the Western hemisphere,

Lieut. George A. Zinn, Corps of Engineers, U. S. A.,

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\* Report of Henry G. Davis and Andrew Carnegie, delegates from the U. S. to the International American Conference.

at the request of Messrs. Davis and Carnegie, members of the committee on railway communication of the International American Conference, prepared an elaborate paper with reference to the railways of Mexico, Central and South America, and the prospects of railway building in these countries, especially with reference to an intercontinental line ; in which he described the topographical features of each group and of each country, especially in those parts where there has been but little railway development. All existing railways are noted, and the most important described ; while full information is given as to projected lines, concessions, finances, etc. He also outlines a plan for an intercontinental railway, adding articles on railway gauges and metal ties.

KOREA.—Mr. J. B. Bernadou, U. S. N., recently entertained an audience in this city with an account of the Koreans. His reminiscences were personal, for he was for some time attached to the American legation at Seoul. He said that the native maps of the country were not reliable, and that the reason why no accurate one existed was because foreigners have only of late years been allowed to penetrate the interior. The ignorance of the Koreans of the outside world, prior to the treaties of 1881-82, was remarkable. The lecturer exhibited a native conception of the earth. The map represented the earth as a circular plane with the land and its outlying islands in the centre, and a ring of unbroken water upon the outside. Around the central area of the mother (China) are grouped different States, among which Korea and Japan are on the eastern side, and some of the European nations on the western. The conservatives yet cling to their old-time notions.



Korea is a mountainous country, with a main chain, bearing an extinct volcano, forming the back-bone of the peninsula. The coast is forbidding. The climate exhibits wide ranges of temperature, from a Nova Scotia winter in the north-east to that of Louisiana in the south. The winter in all but the southern parts is long and severe, and sets in with great suddenness. Mr. Bernadou accounted in an interesting way for many of the traditions and distinctive habits of the people of this little-known region.

POOL OF BETHESDA.\*—The excavations of the Algerine monks under the ruins in the rear of the Crusader church of St. Anne in Jerusalem, have gradually transferred opinion from the Birket Israel in favor of the former locality as the site of the Bethesda. This opinion has been strengthened by the discovery of a rock-hewn pool containing water, beneath three successive structures. Subsequent excavations revealed the remains of two tiers of five-arched porches, the lower tier being in the pool. The intelligent labors of the monks who are in charge of the property have been further rewarded by the recent discovery of another pool, containing a good supply of water, to the westward of that first discovered; the whole agreeing with the descriptions of the Bethesda, as given by the fathers of the Church and Christian pilgrims and writers as early as the fourth century. The correspondence in number of the five porches to those mentioned in the Gospel of St. John will not escape notice. Steps cut in the rock lead down to the water. An ancient Christian church in ruins surmounts the entire space. The remains of the upper tier of porches extend above the pool at right angles from the

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\* Dispatch from Henry Gilman, U. S. Consul at Jerusalem.



north wall of the crypt beneath the church, in which the apse, at the east end, though dilapidated, is distinctly defined. On clearing away the debris that choked the fifth porch westward of the apse, all these discoveries culminated in revealing the remains of a painting, or fresco, upon the plaster of the wall in the rear, the colors of which, quite bright when first discovered, have since greatly faded.

A summary of the discovery would be about as follows: First, the rubbish covering the ruins, and built upon by modern Turkish houses; next beneath is the small church with apse; under this the crypt with five porches containing the frescoes; and fourth, underneath all, the pool itself, cut in the solid rock, and with five arches of well preserved masonry.

NEW ZEALAND.—The United States Consul at Auckland, in a recent communication to the Department of State says that it is impossible to appreciate, or have any adequate conception of, New Zealand's superiority over the other Australian colonies. He makes comparison of several economic and industrial features, common to all of them, but showing preponderating percentages in favor of New Zealand. The wonderful productiveness of her soil is, in many respects, unequalled in the world. The colony is also rich in all kinds of minerals which as yet have not been properly developed. The climate is mild, equable and invigorating. He is surprised that more is not known of the numerous natural hot springs and lakes, and of the health-restoring properties of the former, and sees no reason why New Zealand should not become the invalid's paradise.

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CANADA: THE LAND OF WATERWAYS.

BY

WATSON GRIFFIN.

The belief that our earth was made for man is almost universal throughout the civilized world, and many people in both hemispheres are of the opinion that man is likely to reach the highest state of perfection and the greatest degree of comfort on the continent of North America. Yet the prevailing impression seems to be, that very nearly half of this North American continent is almost unfit for human habitation. This rejected half of the continent, which includes the Dominion of Canada, the island of Newfoundland and the territory of Alaska, lies within the same degrees of latitude as the most populous and most progressive countries of Europe; it juts out into the two great oceans, and is hundreds of miles nearer to both Europe and Asia than any other part of the New World. Looking at the map of America and noting the geographical situation of Canada, it seems strange that the early adventurers from Europe passed it by to seek homes in more south

ern latitudes. But this choice of location was not a mere freak. The early voyagers did direct their ships towards the northern part of the continent. They coasted along the dreary shores of Labrador, ventured into the Arctic Ocean in search of a north-west passage to Asia, and contrasting that inhospitable region with the temperate and fertile countries on the opposite shores of Europe made such unfavorable reports that the tide of emigration was turned to the South, very much farther to the South than necessary.

The shape of North-eastern America is not unlike that of North-western Europe. Labrador slopes away from the Atlantic on one side as does Germany on the other; its north-eastern spur, terminating in Cape Chudleigh is another Jutland; Hudson Strait and Ungava Bay are the Skager Rack, Cattegat and Baltic on a little larger scale; Fox Channel and the Gulf of Boothia resemble the Gulf of Bothnia, and Baffin's Land is the counterpart of Norway and Sweden. Perhaps this comparison would not bear very close analysis if the outlines of the different sections mentioned were taken separately, but there is certainly a general resemblance in the contour of the two coasts. But while the climate of North-western Europe is moderated by the Gulf Stream, the Arctic current chills the opposite shore of America. If all countries lying in the same latitude enjoyed the same climate, the temperature of Labrador would be very like that of Germany, the whole Atlantic coast of British America would be well populated and the metropolis of this continent would probably be located in Newfoundland or Nova Scotia, instead of on the island of Manhattan. But climate depends as much

upon local influences as upon latitude. The elevation, the character of surrounding waters, and the prevailing winds must all be taken into consideration. Nature has dealt harshly with Labrador, but it is a great mistake to suppose that she has treated the whole Dominion of Canada in the same way. On the contrary, the greater part of Canada is particularly favored by local surroundings, and these can best be explained by describing the different provinces separately, but in doing this each section will be considered as a part of the whole Dominion.

Newfoundland, the sentinel island of British North America, has not yet joined the Canadian Confederation, but is expected to do so before long. It is twelve miles from the mainland of Labrador, from which it is separated by the Strait of Belle Isle, and its eastern point is only 1,640 miles from Ireland. It has been suggested that Newfoundland might be made a part of the mainland and the ocean voyage from America to Europe reduced to two or three days by closing the Strait of Belle Isle and extending the Canadian railway system to St. John's, Newfoundland. The project has had the support of several eminent engineers and there are said to be no great difficulties to be overcome in carrying out the scheme, as the filling in material lies close at hand. A ship railway would be constructed across the new isthmus above the railway tracks, so that vessels bound for the St. Lawrence could still take the short route. It is claimed that the closing of Belle Isle would turn the Arctic current quite away from the Gulf of St. Lawrence and marvellously moderate the climate of the western coast of Newfoundland, the Maritime Provinces and the part of Quebec lying along the Gulf.



A less formidable scheme is a proposal to construct a railway from Quebec City along the north shore of the St. Lawrence to St. Charles harbor in Belle Isle Strait, from which a fast line of steamships would be run to Europe; and the promoters of the project believe that by bridging the St. Lawrence at Quebec and running fast trains to Belle Isle this line might be made very attractive to travellers subject to sea-sickness and business men who were pressed for time. However, as the country between Quebec City and Belle Isle is always likely to be sparsely populated, such a railway would have to depend almost entirely upon passenger traffic between America and Europe, unless by connecting with the Newfoundland railways it succeeded in greatly developing the trade between Canada and Newfoundland.

Prince Edward Island, the smallest province of the Dominion, lies at the south of the Gulf of St. Lawrence and is separated from the mainland by Northumberland Strait. It is 150 miles in length, varies in width from four to thirty miles, and has an area of 2,133 square miles, almost every foot of which is suitable for cultivation. The soil is naturally very fertile, and the island has a unique advantage in the possession of inexhaustible supplies of natural manure in the form of mussel mud, formed by the decay of oyster, clam and mussel shells in all the bays and river mouths. A good dressing of this mussel mud is said to have a marvellous effect, restoring fertility to the poorest soils. The chief crop of the island is potatoes, but all kinds of grains and vegetables are produced in abundance and all the fruits of the North temperate zone, excepting peaches and grapes, can be successfully grown. The

islanders claim that they have the best fisheries in the Gulf of St. Lawrence, and they are now devoting special attention to the cultivation of oysters. The island is practically without mineral resources, although coal is believed to exist at a great depth. The climate is by no means severe, and the atmosphere is clear, fogs being seldom experienced. In January and February the thermometer sometimes registers as low as fifteen degrees below zero for a few hours at a time, but such cold is exceptional, the average of all temperatures during January and February for seven years being nearly seventeen degrees above zero. A Government railway runs through the province from end to end, with branches in various directions. Northumberland Strait, which is eight miles across at the narrowest point, never freezes over, but the floating ice is often packed so closely during midwinter that it is difficult to maintain communication with the mainland. A Dominion Government steamer runs regularly with mails and passengers, but the islanders will never be satisfied until the Dominion Government undertakes the construction of a tunnel under the strait.

While the people of Prince Edward have always wished to attach themselves to the mainland, they were for many years almost equally anxious to make Nova Scotia an island by cutting a canal through the Isthmus of Chignecto, thus enabling their ships to reach the Bay of Fundy without going around Nova Scotia. But Mr. H. G. C. Ketchum, a New Brunswick civil engineer, suggested that a ship railway across the isthmus would serve all the purposes of a canal, while it could be constructed at less cost and maintained at less expense.

Mr. Ketchum's proposal was approved by the Dominion Government and a large subsidy was granted to a company undertaking the work, which was begun a year and a half ago, and will be completed this autumn. This ship railway runs from Tignish to Amherst, a distance of seventeen miles in a straight line, and is so level that a person standing at one end can see the masts of the ship at the other end. It will carry ships of one thousand tons, and is so designed that with slight alterations it might be adapted to large vessels, Mr. Ketchum does not anticipate that the railway now being constructed will ever be altered to accommodate vessels of more than 1,200 tons, but he thinks another track will be required in a few years for larger vessels. The Bay of Fundy at the terminus of the ship railway would admit, at ordinary high water, vessels of the largest draught, but at the other terminus the limit would be eighteen feet draught at high water, and a very long dredged channel would have to be made for the approach to the hydraulic lift. The channel now provided is three-quarters of a mile long and admits vessels of only fourteen feet draught. By crossing the isthmus, instead of passing through Canso Strait, vessels bound to St. John, N. B., from all points in the Gulf and river St. Lawrence, will save five hundred miles, while there will be a saving of over seven hundred miles as compared with the route around Cape North, frequently taken to avoid the fogs and winds which prevail in Canso at some seasons of the year.

The Bay of Fundy is noted the world over for its peculiar tides, which are generally supposed to be even more extraordinary than they really are. The Canadian

school geographies make them seventy feet, whereas official records show that they never exceed fifty-five feet at any point, and do not average more than thirty feet. The highest rise is along the Chignecto Isthmus and in the Basin of Minas. At St. John the spring tide is twenty-seven feet, and the neap tide twenty-three feet. There are various theories regarding the cause of these wonderful tides, one being that a portion of the warm Gulf Stream seeks an entrance this way to the Gulf of St. Lawrence, and its incoming current is checked and thrown back by the Isthmus of Chignecto. I do not pretend to know anything about it myself, but if this is a branch of the Gulf Stream trying to force its way to the St. Lawrence, it would be interesting to speculate upon the probable effect of cutting a channel for it through Chignecto, and at the same time closing Belle Isle Strait to shut out the Arctic current. Whatever may be the cause of them, these great tidal waves, rushing up the rock-bound bay, turn inward wherever they find an opening made by a river channel, and go roaring up the valleys under the name of tide bores, so that in Nova Scotia river beds, which ordinarily contain nothing but rivulets, are full of water at flood tide. On the New Brunswick side the rivers, being much more important, do not dwindle to rivulets when the tide is out, but there is a very great difference in the volume of water near their mouths at high and low tides. When the tide is out vast muddy flats are left bare, and it is only during spring tide that they are entirely covered. Thousands of acres of these marsh lands near the river mouths, both in Nova Scotia and New Brunswick, have been reclaimed by dyking, and the land thus made available for agriculture is of extraordi-

nary fertility, producing astonishing crops for years without manure. The alluvial mud is sometimes carried to the uplands to be used as manure, and is almost equal to the mussel mud of Prince Edward for fertilizing purposes. The Bay of Fundy has a very foggy reputation among people unacquainted with it, but the records of the keepers of the numerous fog whistles along the bay do not make such a bad showing. An account kept by the keeper of the fog whistle on Partridge Island, at the mouth of St. John harbor, for seventeen years shows that during the six months, beginning with November and ending with April, the fog averaged 19 hours and 22 minutes per month, or only 38 minutes per day. In the summer months the bay is very often foggy, but the channel being wide, deep and free from treacherous shoals or rocks, while there are fog whistles, automatic whistling buoys and light-houses all along the coast, navigation is always safe. During the ten years from 1877 to 1886 inclusive the tonnage of vessels arriving at and departing from St. John was 10,793,846, and the total loss from disasters and casualties in the Bay of Fundy was only  $\frac{2.6}{100}$  of one per cent.

The Province of Nova Scotia is three hundred and eighty-six miles in length by from fifty to one hundred miles in width, with an area of 20,907 square miles, and extends from the 43d to the 47th parallel of latitude. Its coasts are rugged and uninviting in appearance, and Mr. Herbert Crosskill has compared the province to a splendid painting in a coarse iron frame, but the rough looking frame with its coal, iron and gold, its many commodious harbors and rich fisheries, is as valuable as the fertile interior. Owing to its almost insular position, and perhaps



to the influence of the Gulf Stream, which flows not far from its southern extremity, the climate is very much more moderate than that of the neighboring State of Maine. Extreme cold is seldom experienced in any part of the province, but the northern counties are more exposed to the influence of the Arctic current flowing through Belle Isle than those in the south and along the Bay of Fundy. Thus, Annapolis township, where the climate averages about six degrees warmer than that of the State of Massachusetts, is seven or eight degrees warmer on the average than the counties in Cape Breton and along Northumberland Strait, five or six degrees warmer than Halifax and Colchester counties, and three or four degrees warmer than the famed country of Evangeline, along the Basin of Minas. Yarmouth, the most southern county, has very mild winters. According to the meteorological records at Yarmouth town for the seven years from 1882 to 1888 the minimum temperatures averaged in January and February  $1.3^{\circ}$ ; March  $5.6^{\circ}$ ; April  $21.6^{\circ}$ ; May  $30^{\circ}$ ; June  $38.1^{\circ}$ ; July and August  $42^{\circ}$ ; September  $37.7^{\circ}$ ; October  $28.2^{\circ}$ ; November  $18.4^{\circ}$ ; December  $5.2^{\circ}$ . The average of all temperatures for the seven years from 1882 to 1887 was: in January and February  $25.4^{\circ}$ ; March  $29.5^{\circ}$ ; April  $38.5^{\circ}$ ; May  $47.1^{\circ}$ ; June  $55.1^{\circ}$ ; July and August  $59.8^{\circ}$ ; September  $55.2^{\circ}$ ; October  $47.6^{\circ}$ ; November  $40.2^{\circ}$ ; December  $30.9^{\circ}$ . The average maximum temperatures for seven years were: in April  $59.4^{\circ}$ ; May  $67.9^{\circ}$ ; June  $75.3^{\circ}$ ; July and August  $77.1^{\circ}$ ; September  $72.3^{\circ}$ ; October  $67^{\circ}$ ; November  $58.6^{\circ}$ . The atmosphere of Yarmouth is moist, and the summer temperatures are very much lower than those of the Annapolis Valley. In



Sydney, at the north end of the province, the thermometer sometimes touches thirteen below zero, the average for January and February for seven years being 18.9 degrees above zero, while at Halifax, about half way between Yarmouth and Sydney, the greatest degree of cold experienced in an average winter is between six and seven degrees below zero, the average of all temperatures at that point during January and February for seven years being twenty-two degrees above zero. The winters are short, but, except in the south-western counties, the spring is long and backward, owing to the chilling influence of the ice that drifts through Belle Isle. This is especially true of the island of Cape Breton, which is besieged with drift ice every spring. The climate of all parts of the province is remarkably salubrious, and it is claimed that the average of life is longer than in any other quarter of the globe. According to the census of 1881, the number over eighty years of age in a population of 440,572 was 3,853, while there were twenty-four over one hundred years of age. In New Brunswick, with a population of 321,233, there were 2,227 over eighty, and twelve over one hundred years of age, while Prince Edward Island had eight over one hundred years old, and 883 over eighty years old, in a population of 108,891.

The garden of Nova Scotia is in the Annapolis and Cornwallis valley, a district about eighty miles long and from four to twelve miles wide, protected from the summer fogs of Fundy and the chilling ocean winds by two ranges of hills, known as the North and South Mountains. The North Mountains skirt the south shore of the Bay of Fundy from Briar Island to the

Basin of Minas, terminating in a bold bluff called Cape Blomidon. On the other side of Minas channel the range is continued under the name of the Cobequid mountains, acting as a shield against the cold winds coming from the Gulf of St Lawrence in the spring. The whole Annapolis Valley is an orchard of apples, which command a higher price in the English markets than those grown in any other quarter of the world. In this valley and its extensions there are already about forty thousand acres of apple trees. Thousands of trees are being planted every year, and it is estimated that there are nearly four hundred thousand acres capable of producing the very finest fruit. With forty trees to the acre and each tree averaging four barrels, the wealth producing possibilities of the district are immense. While the climate and soil seem particularly adapted to the production of apples, they are also favorable to peaches, grapes, melons and tomatoes; Indian corn is extensively cultivated, Chinese sugar cane has been successfully grown, and it is alleged that peanuts have been raised and ripened in the open air from seed obtained in South Carolina. King's county, the scene of Longfellow's *Evangeline*, although not quite so warm as Annapolis township, is equally fertile, and the dyked lands are as productive now, after centuries of tillage, as when they were cultivated by the simple Acadians. All the other counties bordering on the Basin of Minas, and those lying along Cumberland Strait and the Gulf, are good agricultural districts. Excepting Yarmouth, none of the counties along the Atlantic coast are generally well adapted for agriculture, although they contain small tracts of excellent farming lands, and no

doubt some of the land, now considered unsuited for cultivation, could be made productive under a system of scientific farming.

Very little wheat is now raised in Nova Scotia, chiefly owing to the fact, that when it was extensively grown some years ago, the weevil was very destructive. Then the deep rich soil of the lowlands is lacking in silica, while the thin soil of the uplands, which used to produce good crops of wheat, has been worn out by cropping and can only be restored to productiveness by means of fertilizers.

The gold bearing rocks of Nova Scotia extend along the Atlantic coast from Canso to Yarmouth, and are estimated to cover about three thousand square miles. Very little capital has been invested in their development, but nearly twenty thousand ounces of gold are annually extracted. Silver, copper, tin, lead, manganese, plumbago and gypsum have also been found in the province, but have not yet been extensively mined. But Nova Scotia has most reason to thank Nature for the stores of coal and iron, with which the province is so richly endowed. The known productive coal fields occupy an area of 685 square miles, the veins being of extraordinary thickness, and there are believed to be considerable areas as yet unproved. The coal is bituminous, of first-class quality, particularly adapted to steam making, and as a rule well suited to the manufacture of iron. The principal mines are in Cape Breton, Pictou and Cumberland counties. The only place in Nova Scotia where iron is systematically mined is in Colchester county, but valuable iron ores exist in many parts of the province, while in Pictou and Cape Breton

counties they lie so close to the coal measures that iron making must eventually become the chief industry. At Londonderry, in Colchester county, two large furnaces are now in blast, and the iron produced is of superior quality, but as the iron works are situated in an inland town, with no water communication and very inadequate railway facilities, while both fuel and iron ore must be carried to the furnaces from a distance, the location does not seem to be particularly good. The best location for iron works in Nova Scotia appears to be in Pictou county. Here four different varieties of iron ore are found in large quantities within a few miles of each other, and are only separated from the coal measures by bands of carboniferous limestones, well adapted for fluxes. The town of New Glasgow is the centre of the Pictou coal district, and either here or at Pictou harbor, a few miles away, will grow up a great iron making city, which will be to Nova Scotia what Pittsburgh is to Pennsylvania.

Along Nova Scotia's five hundred miles of sea-coast are the breeding and feeding grounds of countless millions of fish. Prosperous fishing villages are found all along the rough looking coast, and the annual catch is greater than that of any other Canadian province. The timber resources are great, extensive lumbering operations are carried on, and ship building has always been one of the chief industries of the province, which owns more shipping in proportion to population than any other country in the world.

The railway facilities of Nova Scotia are good. The Government Intercolonial Railway, upon reaching Truro, sends out one branch to Port Mulgrave on Canso

Strait, and another to Halifax. From Canso Strait this Government railway is now being extended to Sydney, Cape Breton, and the work will soon be completed. There are also several railways in the province not controlled by the Government. At present there is no large city in Nova Scotia, although, if the business of the province were more concentrated, it would be sufficient to maintain one. In fact, the great need of Nova Scotia is concentration. There are too many good harbors, too many ports of entry, too many small towns, none of which can afford to provide adequate facilities for the cheap shipment of goods on a large scale. There are eleven harbors open throughout the year, viz.: Halifax, Louisburg, Yarmouth, Annapolis, Barrington, Liverpool, Lockport, Lunenburg, Parrsboro and Shelbourne, besides a host of good harbors which are open nine months of the year, but Halifax and Louisburg are the only ones, whose geographical position makes them available as winter ports for the Dominion at large.

Halifax, the capital of Nova Scotia, and the only city in Canada now occupied by British troops, has a population of about 45,000. It is 594 geographical miles nearer to Liverpool than New York, and has been declared by British naval authorities to possess the finest harbor in the empire. This harbor, which is six miles long, one mile wide, and opens into Bedford Basin, a deep land-locked bay six miles long by four wide, is easy of access and open throughout the year, but vessels are occasionally delayed outside by fogs. Its wharves are extensive, and it has the finest dry dock in the world, capable of taking in Her Majesty's ship *Inflexible*, the





HALIFAX.

largest ironclad afloat. Adjoining this dry dock is a large coaling wharf, with facilities for the rapid coaling of vessels and storehouses containing everything necessary to the rapid fitting out of ships.

Louisburg, Cape Breton, has a magnificent harbor, which is frequented throughout the year by vessels seeking refuge from Atlantic storms. It is close to an immense coal field, and is said to be the only port in America, this side of Vancouver, where coal could be obtained at mine prices in winter. The approach is bold and free from outlying shoals, the entrance being about half a mile wide with a depth of from nine to eleven fathoms of water; and fogs rarely occur in the vicinity. This port is about 750 miles nearer to Liverpool than New York, and vessels making for it avoid dangerous



Sable Island, which those bound for Halifax, St. John, Portland or Boston, must pass. It is nearly 200 miles nearer to Europe than Halifax, and it is claimed that in winter the ocean voyage from Liverpool to Louisburg is practically 300 miles shorter than that to Halifax, so that, if the port were connected with Montreal by a direct line of railway, passengers landing there could be in Montreal many hours earlier than by taking the Halifax route. According to a survey made a few years ago, a direct line of railway between Louisburg and Canso Strait need not exceed eighty miles in length. From Canso to Moncton, New Brunswick, by the Intercolonial Railway, is 248 miles, but a much shorter line could be constructed between the two points. The distance from Halifax to Moncton is 187 miles. During the French *régime* Louisburg was the strongest fortress in America; now it is nothing but an unprogressive hamlet, having no railway connection with the rest of the continent excepting a narrow gauge coal tramway to Sydney. If direct railway communication is established, and the iron resources of Cape Breton are developed, a thriving town may grow up near the site of the old fortress, but it will always have strong competition from the towns of Sydney and North Sydney on opposite sides of the capacious harbor of Sydney, which affords perfect protection to the largest vessels for nine months of the year. Nine coal mines are tributary to these towns, and iron, copper and manganese abound in the vicinity.

New Brunswick adjoins the State of Maine, and is in many respects its counterpart, but it has a much longer coast line, and the surrounding waters tend to moderate

its climate somewhat. There is a pronounced difference between the winter climate along the Bay of Fundy coast, and that of the interior and northern counties. According to the Dominion meteorological records from 1882 to 1888 the minimum temperatures at St. John for seven years averaged: in January and February— $14.5^{\circ}$ ; March— $3.1^{\circ}$ ; April  $16.5^{\circ}$ ; May  $30.1^{\circ}$ ; June  $39.9^{\circ}$ ; July and August  $44.6^{\circ}$ ; September  $35.1^{\circ}$ ; October  $25.8^{\circ}$ ; November  $10.6^{\circ}$ ; December— $1.6^{\circ}$ . The average of all temperatures for seven years was: in January and February  $17.9^{\circ}$ ; March  $26.4^{\circ}$ ; April  $37.3^{\circ}$ ; May  $47^{\circ}$ ; June  $56.1^{\circ}$ ; July and August  $60.4^{\circ}$ ; September  $54.4^{\circ}$ ; October  $45.2^{\circ}$ ; November  $36.1^{\circ}$ ; December  $24.3^{\circ}$ . The average of maximum temperatures for seven years was: in April  $60.7^{\circ}$ ; May  $69.5^{\circ}$ ; June  $77.5^{\circ}$ ; July and August  $83.8^{\circ}$ ; September  $75.3^{\circ}$ ; October  $63.1^{\circ}$ ; November  $56.9^{\circ}$ . At Fredericton, not far from the centre of the province, the greatest degree of cold in an average winter is between 25 and 26 degrees below zero, the average of all temperatures during January and February for seven years being between 12 and 13 degrees above zero, while at Bathurst on the Bay of Chaleur the greatest degree of cold in an average winter is 22 degrees below zero, and the average of all temperatures during January and February for seven years is about one degree lower than that of Fredericton.

The most notable feature of the province is its extensive system of navigable rivers. The chief of these is the St. John, which is navigable for large steamers as far as Fredericton, the capital of the province, 85 miles above St. John City, and for lighter craft as far as the Grand Falls, 225 miles from the sea. It receives a

number of navigable tributaries, and has many lake expansions. In the lower part of its course it is very wide and remarkably deep, but before reaching the harbor of St. John it contracts and passes between two perpendicular cliffs, only three hundred feet apart. About a mile above the city a ledge of rocks stretches across the river, forming a dam, and a waterfall which under ordinary circumstances would necessitate the construction of a canal, but a sort of natural lock is formed by the tides ; for at high tide the water level of the harbor is higher than that of the gorge, so that there is a fall inward instead of outward, and at half tide during both rise and fall the water in the gorge is level with the harbor, and vessels can pass through in safety. Besides the St. John, the Bay of Fundy receives the waters of the St. Croix, the Petitcodiac, and a number of smaller rivers. The other important rivers of the province are the Mirimichi, Richibucto, and Nepisiquit, emptying into the Gulf of St. Lawrence, and the Restigouche, flowing into the Bay of Chaleur. Excepting the St. Croix, which is only navigable for sixteen miles from its mouth on account of rapids, all these rivers are navigable for many miles and most of them have a number of navigable tributaries, so that almost every part of the province has communication with the sea. The rivers run through tracts of low-lying alluvial land of remarkable fertility, sometimes extending for miles back from the river, but generally less than a mile wide. These low lands, which are called *intervals*, are partly covered with water in the spring, when the rivers are high. When brought under cultivation, they rank only second to the dyked lands along the coast of Fundy. The total area of the province is seventeen

million acres, and thirteen million acres are estimated to be suitable for agriculture.

Millions of acres in the most fertile sections still remain unoccupied and can be obtained by settlers as free grants, or purchased at very slight cost. New Brunswick does not at present raise enough wheat to supply its own population, although large areas of the province are suitable to wheat culture, and the average yield per acre is estimated at twenty bushels in the Government reports. The farmers in general raise enough wheat for their own consumption, but they seem to find it more profitable to grow hay and vegetables for market, so that the cities and towns are allowed to buy Western wheat and flour. A good deal of attention is now being paid to fruit growing and very fine apples and pears are produced, while the smaller fruits, such as cherries, raspberries, blackberries and blueberries, are raised in great quantities. But the province seems to be particularly adapted to stock raising and dairying, on account of the luxuriant pasturage, unfailing supplies of water and nearness to the markets of both Europe and the Eastern States. Iron ores are found in abundance in various parts of the province, and charcoal can be produced from the forests of hardwood in any quantity desired. There are extensive deposits of antimony, copper and manganese, while lead, silver, gold and tin have been discovered in various sections, but very little capital has been invested in their development and the value of the deposits is unknown. All New Brunswick was at one time a dense forest, and although enormous quantities of timber have annually been cut for many years, there still remain millions of acres of trees which have never

been touched by the axe. These forests are so near to navigable rivers connecting with the sea that the facilities for exporting lumber are unequalled, but it has been argued with some force that, instead of exporting the rough timber, the people of New Brunswick should manufacture it into furniture and all kinds of wooden ware for export. Anthracite coal has been discovered in small quantities in Charlotte county on the Bay of Fundy, and there is bituminous coal in almost every county of the province, but so far as known the seams are all very thin, and the only one that is considered worth mining is at Grand Lake, in Queen's county, where a seam twenty-two inches thick is estimated to extend over an area of 600 square miles. This coal is excellent for steam purposes and is said to be unsurpassed for coking, but there is a streak of sulphur in it which detracts from its value as a fuel for blast furnaces. Compared with the marvellously thick seams of Nova Scotia the coal measures of New Brunswick seem of little value, but they have the advantage of lying much closer to Quebec and Ontario, which are destitute of coal, and it is possible that thicker seams may yet be discovered. Fishing is prosecuted in the Bay of Fundy, and the estuaries of the rivers flowing into it, at all seasons of the year, and in the Gulf of St. Lawrence and the Bay of Chaleur from April to November inclusive, giving employment to thousands of men. The inland waters are full of salmon, trout and other fish which attract sportsmen from all parts of this continent, and even from Europe, the Restigouche, the Mirimichi and their tributaries being especially noted for their salmon.

The most interesting commercial question now before

the Canadian people is the location of the winter port on the Atlantic side of the Dominion. Before confederation the whole foreign trade of Canada passed through American ports during the winter months. After confederation the construction of the Intercolonial Railway made the ports of New Brunswick and Nova Scotia available, but when trade has got into a rut it is difficult to alter its course, and as the Intercolonial Railway followed the line of settlement instead of taking a short and direct route to the maritime ports, St. John and Halifax could not compete successfully with their American rivals, especially as the Dominion Government subsidized a line of mail steamships having its terminus at Portland, Maine, an American port. Now a new order of things has begun. The maritime ports of Canada are connected with Montreal by two short lines of railway, one cutting across the State of Maine, and the other running entirely through Canada, so that the distance is lessened by several hundred miles, and at the same time the Dominion Government has decided that steamship lines subsidized with Canadian money must make a Canadian port their terminus. Consequently a great deal of business, now handled by Boston and Portland, is likely to pass through New Brunswick and Nova Scotia. New Brunswick has many fine harbors, but only those along the Bay of Fundy are unobstructed by ice at all seasons of the year. Of these the ones talked of in connection with the short lines of railway are St. John and St. Andrews. St. John, the metropolis of New Brunswick, is situated at the mouth of the St. John River, which, with its lake expansions and numerous affluents, makes all the central and north-western coun-



ties of the province tributary to the city during the season of inland navigation. The ice which forms in the river St. John is held back by the Narrows above the city, and the high tides make it impossible for ice to form in the harbor itself at any season of the year, so that the harbor is never obstructed by floating ice, and it has never been frozen over. It is claimed that this cannot be said of any other port on the Atlantic coast of America north of Baltimore. St. John harbor is not so capacious as that of Halifax, but the largest vessels can now be accommodated, and the space which can be made available for deep water wharfage by a slight expenditure is almost unlimited. The harbor is easily entered in any weather, so that vessels never have to wait outside on account of fog as they sometimes do at Halifax. The ocean voyage from Liverpool to St. John is about 200 geographical miles longer than to Halifax, but nearly 400 miles shorter than to New York, nearly 200 miles shorter than to Boston, and about 156 miles shorter than to Portland, Me. The distance to Montreal by the Canadian Pacific short line through Maine is 481 miles, the distance from Halifax to Montreal being 758 miles. By the Temiscouata line, running entirely through Canada and connecting with the Intercolonial at Rivière du Loup, the distance from St. John to Montreal is 590 miles, but it is claimed that the grades are much easier than by the line through Maine. It is said that the Grand Trunk company is about to acquire the Temiscouata Railway with a view to extending its line to St. John, so that the three great Canadian railways, the Canadian Pacific, Grand Trunk and Intercolonial are likely to be compet-

ing for the trade of the city before long, and several Provincial railways are also tributary to it. Whether or not St. John becomes the chief Atlantic port for the Dominion, it is certain to be a large city, for its position makes it the natural metropolis not only of New Brunswick, but also of the south-eastern part of Quebec, the fruitful Annapolis Valley of Nova Scotia and all the country around the Basin of Minas, while the Chignecto ship railway will soon make the fertile Province of Prince Edward Island tributary to it. The effect that this ship railway will have upon the future of St. John can scarcely be realized. It is a remarkable fact that the water route from St. John to Montreal will be shortened by 500 miles, almost simultaneously with the reduction of the railway journey by the construction of the two short lines. This practical change in the geographical position of the city is probably unique in the history of commerce. If the Chignecto ship railway and its approaches could be made to accommodate the largest ocean vessels, St. John would be practically as near to Europe as Halifax, and being so much farther inland would undoubtedly become the Liverpool of Canada. St. John is a well-built town and has a lively go-ahead population of about fifty thousand inhabitants, nearly all of whom have confidence in the future greatness of their city. They are particularly proud of the fact that London, Liverpool and Glasgow are the only cities in the British Empire which surpass St. John in numbers, tonnage and size of vessels owned. The central position of St. John makes it the most favorable point for the concentration of the fish trade of Prince Edward Island, Nova Scotia, New Brunswick and the

Gaspé peninsula of Quebec ; on account of the cheap timber at its command, it could easily take the lead in the manufacture of furniture and all kinds of wooden ware for the markets of Europe, the West Indies, Central America and South America, if sufficient capital were invested to do business on an extensive scale, while, being surrounded by hills of limestone and having access to unlimited supplies of iron and rock maple in New Brunswick, and inexhaustible mines of coal near at hand in Nova Scotia, it is a favorable point for the making of iron either with charcoal or coke as fuel. During the season of St. Lawrence navigation it could get cheap supplies of iron ore from Quebec and Ontario for mixing with the local ores, if required. In some respects, it would even have the advantage of Pictou county and Cape Breton where coal, iron and limestone lie side by side, for with its competing railways and extensive shipping interests it could get lower freight rates, and the fact that the port is always open would give it an advantage in case of a strike at the neighboring mines, as raw materials could be temporarily obtained from outside points. The Dominion Government proposes to subsidize a line of steamships running between St. John and South American ports, and it is interesting to note that, according to a report published by the Canadian Minister of Public Works, St. John, which is over 2,000 miles nearer to Liverpool than New Orleans, is also over 260 miles nearer to Rio Janeiro or Buenos Ayres than the city at the mouth of the Mississippi, and while Baltimore is about 750 miles farther from Liverpool than St. John, it is only about fifty miles nearer to Rio Janeiro. Of course these figures do

not represent the distances in a bee line, but by the routes for ocean vessels, and the explanation is that ham-shaped South America lies much farther to the East than North America, and its northern coast-line is very long.

St. Andrews, situated on a peninsula projecting into Passamaquoddy Bay at the mouth of the St. Croix River, has a remarkably good harbor, which is almost as free from ice as that of St. John. It is a very pretty place, and American capitalists have taken hold of it with a view to making it a great summer resort.

Moncton, the headquarters of the Intercolonial Railway, from which the railway extends to St. John and various points in Nova Scotia, is likely to be a city of some importance. It is situated at the head of navigation on the Petitcodiac River. All along the Gulf of St. Lawrence are numerous fine harbors, and those of the Bay of Chaleur are particularly good. To describe their advantages, or even mention their names, would occupy too much time, but before passing up the St. Lawrence to Quebec it may be noted that the harbor of Shippegan, which has been very highly praised by Mr. Sanford Fleming, is 148 miles nearer to Liverpool and 271 miles nearer to Montreal than Halifax, and it has been proposed to run a fast line of steamships from this point to connect with a railway across Newfoundland, which would carry the mails to St. John's, whence they could again be transferred to mail steamers bound for Europe. It has been claimed that mails, passengers and light freight could in this way reach the British Isles more quickly than by any other route. However, the harbor of Shippegan is blocked by ice for three months of the year.

The Province of Quebec might with accuracy be included among the maritime provinces, for the Gulf of St. Lawrence is really a part of the Atlantic, and salt water washes the sinuous coasts of the province for nearly 2,500 miles. The influence of the tide is felt at Three Rivers, 900 miles from Belle Isle, and although the great blue river is estimated to pour two million gallons of fresh water into the Gulf every minute, the water is salty at St. Thomas, about thirty-six miles below Quebec City and at Kamouraska, about forty miles farther down, salt was manufactured from the water by evaporation during the French *régime*. But ocean navigation does not end where the water becomes fresh, the largest ocean vessels being able to ascend to Montreal.

The St. Lawrence between Quebec City and the Gulf is from ten to thirty-five miles wide, and very deep. It is skirted on the north by the Laurentian Mountains, which rise in some places near the shore to heights of over 2,500 feet, and on the south by the Alleghanies, whose peaks attain a height of nearly four thousand feet within a few miles of the river. Other countries have their lakes, rivers and mountains, and are washed by sea waves, but Quebec is probably the only one where lake, river and sea mingle between mountains in such a way that no man can tell where lake and river end, or sea begins. There are many depressions in the mountains to let the little rivers through, and at Tadousac, about 122 miles below Quebec City, some great convulsion of Nature has cleft a chasm through a lofty mountain, and almost into the bowels of the earth, giving vent to black and gruesome Saguenay, the deepest river in the world. The bottom of the chasm through which the Saguenay

flows is six hundred feet below the bed of the St. Lawrence, and for over sixty-three miles the sea surges between the mountains to meet the river coming down from Lake St. John, affording navigation for large ocean vessels, while river steamers can ascend to Chicoutimi eight miles farther up, and no doubt the Saguenay could be made navigable for large ocean vessels as far as Chicoutimi. In the vicinity of Quebec City the St. Lawrence River contracts, and the mountains trend away to the north and south, leaving a fertile alluvial valley stretching from Quebec to Montreal. Above Quebec the river is generally about two miles wide, but sometimes contracts to one mile, and here and there expands. To a point forty-five miles above Quebec City the depth is from forty-five to one hundred feet, while from there to Montreal there is a depth of from thirty to fifty feet, except in shoal places, of which there are twenty between the two cities, with an aggregate length of nearly forty miles. To enable ocean vessels to reach Montreal, it has been necessary to dredge channels through these shoals. The longest shoal is where the river expands to form Lake St. Peter, which is nine miles wide, twenty miles long, and has a general depth of from eleven to eighteen feet, with a few deep pools. Along the bottom of this lake a canal has been excavated for seventeen miles, giving a ship channel  $27\frac{1}{2}$  feet deep and from 300 to 450 feet wide. Over fifteen million cubic yards of gravel, sand, clay and rocks were taken out of the lake bottom in making this channel, and you may be sure the St. Lawrence was not dammed up while the work was going on.

The season of navigation on the St. Lawrence varies



somewhat in different years. A record of the opening and closing of navigation at the city of Quebec for sixty-eight years, from 1814 to 1882, shows that the earliest date for the opening of navigation was April 12 and the latest May 11, while the earliest date of closing navigation was the 23d of November, the average season being about seven months. At Montreal the record does not extend over so long a period, but for the ten years from 1879 to 1889 inclusive the earliest opening of navigation for river craft was April 11 and the latest May 5, while the earliest closing of navigation was December 3, and the latest closing the end of the first week in January. The earliest date for the arrival of the first vessel from sea at Montreal during the last ten years was April 27, and the latest May 6, while the earliest date for the last departure of vessels for sea was November 20, and the latest November 28. But many people believe the season of navigation might easily be extended. The river below Quebec City is open throughout the year, but navigation is somewhat obstructed by floating cakes of ice, and along the south shore ice forms in all the harbors. On the north shore for some reason the water is more salt than on the south shore, and the prevailing winds being from the north, what ice forms usually drifts over to the south shore ; but the Intercolonial Railway runs along the south shore, and the channel there is better lighted and buoyed, so that it is usually taken by vessels. The Saguenay River for seven miles from its mouth never freezes over, and it has been suggested that Tadousac might be made the winter port of Canada, but there is not room to build a large city there on account of the mountains, and the harbor is sometimes

filled with floating ice in the winter. In the Gulf of St. Lawrence navigation seems to be most obstructed in the spring, when the ice in the many bays along the coast breaks up and floats out, sometimes almost blocking the channel.

Between Quebec City and Montreal the channel does not freeze until an ice bridge is formed by jams of floating ice from the lakes above, or along the shore. It is argued that by means of cribs in Lake St. Louis, above Montreal, an ice bridge could easily be formed at the beginning of the season, which would prevent the lake ice coming down to the harbor, and that if the lake ice were kept back there would be little difficulty in keeping the channel open below Montreal. Hon. Mr. Rhodes, the commissioner of agriculture in the Quebec Government, who has made a study of the river for years, is of the opinion that by keeping four sealing boats, such as the *Alert*, running constantly between Quebec and Montreal, it would be easy to prevent the formation of an ice bridge between the two cities, and he says that river steamers could maintain communication between Montreal and the maritime provinces throughout the winter, while the season of navigation for ocean vessels could be somewhat extended. He believes, too, that, if the river channel were kept open, the climate would be somewhat moderated, and that spring planting would begin at least a week earlier.

Besides the St. Lawrence, Quebec has sixty-nine rivers, with an aggregate length of 6,837 miles. Sixty-four of these, with an aggregate length of 6,504 miles, empty into the St. Lawrence directly, or indirectly through its tributaries; five flow into the Bay of

Chaleur. Because of the numerous rapids very few of these rivers are navigable for long distances, but the rapids do not offer any serious obstacle to floating timber, and they furnish almost innumerable water powers for manufacturing purposes. The Ottawa, St. Maurice, Yamaska, St. Francis and Richelieu are navigable for many miles.

The Richelieu River, the outlet of Lake Champlain, empties into the St. Lawrence at Sorel, forty-six miles below Montreal. To make this river navigable from the St. Lawrence to Lake Champlain for boats drawing six and a half feet of water, it was necessary to construct a dam and a lock one-eighth of a mile long at St. Johns, and a canal twelve miles long between Chambly and St. Johns. From Whitehall, at the lower end of Lake Champlain, the Champlain canal, navigable for vessels drawing 4 feet 2 inches of water, extends to the Erie Canal, making connection with the Hudson River. The distance from Montreal to New York by this waterway is 457 miles, of which only 85 miles is by canals, the remaining 372 miles being open navigation.

The lakes of Quebec have never all been named or numbered. There are thousands of them, all abounding in fish. They are scattered throughout the province, but seem to be most numerous in the territory lying between the Saguenay and St. Maurice rivers, and extending from Quebec to Lake St. John. Here land and water are mixed together in just the proper proportions to make it the paradise of sportsmen, and since the completion of the Quebec and Lake St. John Railway, the district is easily accessible to tourists. Lake St. John itself is 28 miles long, and to the north-east of

it lies mysterious Mistassini, for many years supposed to be of vast extent, but recently proved to be only about one hundred miles long.

Quebec Province is estimated to have a land surface of about 120,000,000 acres after deducting the area occupied by lakes and rivers. How much of this vast territory is suitable for cultivation is a matter of conjecture, for the greater part of it is an unsurveyed wilderness. About twenty-nine million acres have been surveyed and divided into farm lots, and of this area about twenty-two million acres have been sold or allotted in free grants, leaving about seven million acres of surveyed public lands still undisposed of, besides the great northern wilderness, of over ninety million acres, which has not been surveyed.

A territory of such an area of course has a varied climate. At Montreal, according to the meteorological records for the seven years from 1882 to 1888, the greatest degree of cold experienced, during January and February of an average winter, is—22.6°; March—8.9°; April 13.5°; June 45.4°; July and August 46.9°; September 36.7°; October 25.1°; November 8° and December—14°. The average of all temperatures for seven years was, in January and February 11.4°; March 20.9°; April 37.8°; May 53.8°; June 64.9°; July and August 67.4°; September 57.3°; October 44.5°; November 32.2°; December 17.7°. The average maximum temperature for seven years was, in April 67.6°; May 77.9°; June 85.3°; July and August 85.5°; September 79.6°; October 68°; November 59.4°. In Quebec City the greatest degree of cold experienced during the months of December, January, February and March, is

between one and two degrees lower than in Montreal. The average of all temperatures during January and February is several degrees higher than in Montreal, but in all the other months the average temperature is several degrees lower than at Montreal, and the season without frost is nearly three weeks shorter. The Lake St. John district affords a very good illustration of the fact that climate depends more upon local influences than upon latitude. Although situated one hundred miles north of Quebec City, its temperature averages several degrees higher and the summer is several weeks longer. There is a large area of good wheat land in this district, and it is now being rapidly settled. Another northern district that has made great progress of late is in the vicinity of Lake Temiscaming on the boundary of Ontario, about three hundred miles north-west of Montreal. The climate is about the same as at Quebec City. The section of the province bordering on the lower St. Lawrence, partly owing to its mountainous character and partly to the influence of the Arctic current flowing through Belle Isle, has a rather severe climate, and is not generally well suited to agriculture. The country north-east of Anticosti is little better than Labrador, and Anticosti itself is generally considered scarcely fit to live in. West of that the climate is better, and there is a good deal of fertile land in the valleys, but on the whole the country along the river, below Quebec City, offers no special attractions to agriculturists. However, all the numerous indentations of the coast swarm with fish, and the fishing industry, already extensive, is capable of great expansion. The islands in the river west of Anticosti are all fertile.

Orleans Island, below Quebec City, has always been noted for its grapes. The best agricultural region of the province is the fertile valley extending on both sides of the river from Montreal to Quebec City, and reaching as far as Kamouraska, on the south shore, with a total area of nearly twelve thousand square miles. This was once a great wheat producing region, but it has been to some extent exhausted by over cropping. Indian corn is cultivated in the south-west, and throughout the valley apples are grown, while grapes are produced in the open air as far east as L'Islet on the south shore, 70 miles north-east of Quebec City.

One of the most flourishing branches of agriculture in this province is tobacco growing. Tobacco culture on a small scale is quite common, and there are a few large plantations. Mr. F. A. Med Foucher, of St. Jacques de l'Achigan, in Montcalm county, has tried forty varieties of tobacco, and has had remarkable success with twenty-two varieties. Fourteen varieties which he exhibited at the Indian and Colonial Exhibition, in London, in 1885, won the highest praise from the judges. Mr. Med Foucher declares that during the last ten years he has annually grown from 12,000 to 40,000 lbs. of tobacco, and during that time he has never lost more than 150 lbs. from frost in any one year. Tobacco can be successfully grown in this province as far east as Quebec City. About 2,500,000 pounds of tobacco are annually grown in Canada, and the greater part of this is produced in Quebec Province. But the Province of Quebec is probably better suited to stock raising than any other branch of farming. Good grazing land, watered by springs, streams and lakes, abounds



almost everywhere from Lake St. Francis to the extremity of Gaspé. It is not, and never can be a ranch country; the snow lies too deep in winter, but proximity to European markets and cheap transportation largely offset the cost of winter housing. Dairy farming is now attracting special attention, and in the district between the St. Lawrence River and the American boundary, commonly known as the "Eastern Townships," there are already many fine herds of cattle, with some of the best blood in America.

Quebec has still an immense area of uncut timber, and if indiscriminate destruction is provided against, this may prove the most valuable asset.

There is no coal in Quebec Province, but there are many deposits of iron. The richest beds yet discovered are in the County of Ottawa. Near the Gatineau River, within a few miles of the city of Ottawa, is a hill of magnetic iron, which has been estimated to contain 100,000,000 tons of accessible mineral of the best quality. Eight miles north-east of Ottawa City is the "Haycock" mine of hematite ore, where Professor Chapman estimates that there could be an output of 100 tons of ore per day for 150 years, without exhaustion. There are believed to be other rich beds in the neighborhood. Deposits of iron ore have also been found in many other parts of the province, including the Eastern Townships. At Moisie there are immense beds of very valuable iron ore, and large quantities of bog iron ore of remarkably good quality are found in the district of Three Rivers.

Discoveries of both gold and silver have been reported in many parts of the province, but seldom in paying

quantities, and very little of either has been mined. Geologists say there is gold in many of the rivers and that rich deposits exist in Beauce, Compton, and surrounding counties, but the total value of the gold mined since confederation amounts to less than half a million dollars, and the output has never exceeded 3,300 ounces in one year. Most of the silver taken out is found in the copper ores, which are widely scattered throughout the province, and are very valuable in some sections. Copper is now mined on an extensive scale in the Eastern Townships and the annual output is between two and three million pounds. In Megantic, Richmond and Wolfe are large deposits of what is pronounced the finest asbestos in the world. Several companies are now engaged in mining it, and most of the output is exported, being manufactured into all kinds of fireproof clothing and building material. There are deposits of apatite, or phosphate of lime, in various sections, the richest mines being located in Ottawa county. This county is probably the richest mineral district of the province. Its extensive deposits of iron ore have already been referred to. Mica is found, and the plumbago mined here is said to be better suited to the making of crucibles than any found elsewhere, excepting that produced on the island of Ceylon.

The farms of Quebec Province are generally long narrow strips of land, frequently having a frontage on some river road, with houses and outbuildings near the river banks, so that the farm houses stretch for miles along the rivers, looking like continuous villages; and just as the rivers of the province here and there spread out into lakes, so these straggling farm villages at certain points

expand, and become towns and cities with varied industries. Most of these towns are only of provincial importance, but the trade of the whole Dominion is largely tributary to Montreal, and to some extent to Quebec City. Quebec City in its historical and picturesque aspects is probably better known to the world at large than any other town in Canada. Its quaint, old-fashioned streets, its impregnable fortress, and the grandeur of the surrounding scenery have so often been described by tourists that every one is familiar with them. It looks like a fossil town of the seventeenth century, and one might expect to dig it out of a rock rather than to find it perched on top of one. But it is neither so old nor so slow as it looks. It is true that a good sized town was there when the rest of Canada was a wilderness, and many of the old houses stand to-day, but a new city, fashioned after the old models has grown up around them, and during the last ten years the increase in population in the city and suburbs has been considerable, while in tanning, shoe making, and several other lines of manufactures, the growth has been quite remarkable. The beautiful Montmorency Falls near the city are now being utilized to generate power for manufacturing purposes.

But although Quebec is not quite so slow as appearances would indicate, it cannot yet be classed among the enterprising cities of Canada. However, its citizens are at least active in trying to secure Government assistance for a railway bridge across the river at this point, and such a bridge is certain to be built sooner or later. Connection with the south shore is now secured by a ferry from Quebec to Levis, just across the river. At present the

only railways between Quebec City and the North-west run through Montreal, but the Quebec and Lake St. John Railway is to be extended westward to Lake Temiscaming, and eastward to Port Alphonse on the Saguenay, ten miles below Chicoutimi, and it is claimed that this railway with its connections will reduce the distance between Quebec City and the North-west by 160 miles, and that it will run through a fertile country which will become tributary to Quebec City. When the St. Lawrence is bridged, this railway, in connection with the Temiscouata Railway, will also give St. John, N.B., and Halifax, a line to the North-west entirely through Canadian territory, considerably shorter than the Canadian Pacific Railway, a part of which runs through Maine.

It is no exaggeration to say that Montreal, the commercial metropolis of Canada, has the most remarkable situation of any city in the world. Located on an island at the confluence of two great rivers, one of which is the outlet of a system of vast lakes, although 960 miles inland, its harbor can be reached by the largest ocean vessels. Around the upper part of the island the two great rivers form lakes, affording harbor room for an immense fleet of lake vessels, and then the St. Lawrence descends to the lower harbor in extraordinary rapids, which make it impossible for ocean vessels to pass the city to the lakes above, and at the same time generate power sufficient to run all the machinery in a great city, while the Ottawa, dividing into two rapid streams, runs down at the back of the island, thus providing another water power and a waterway for floating timber, without obstructing the harbor of Montreal. Eventually the city will certainly spread over the whole island, which is about 32 miles long

and four to eight miles wide, but at present it occupies only a small part of it, being built on a series of terraces between the river St. Lawrence and Mount Royal. Solid, conservative yet progressive, it has always been prosperous, but in the past a lack of public spirit has somewhat retarded its growth. Now, however, the desire for improvement seems to animate the whole community; millions of dollars are to be expended on harbor improvements, narrow streets are being widened, good pavements are being laid, and every street is brilliantly lighted with electricity. Being built entirely of stone and having many fine squares, substantial business blocks, magnificent residences, large churches and numerous colleges, with the green mountain park in the background and the great blue river flowing by, the city is certainly one of the most beautiful in America, and when the projected improvements are completed every Canadian may justly feel proud of it. The population in 1881 was 140,000; in January, 1890, the assessors estimated it at 240,000, and there are believed to be from 25,000 to 35,000 people in the suburbs, which have grown up around the city since the last census. On reaching Montreal one first realizes that Quebec and Ontario are geographically one. Commercially this city belongs to Ontario rather than to Quebec Province, and the extraordinary advantages of its situation cannot be appreciated without a knowledge of Ontario's agricultural and mineral resources, its great natural waterways and its extensive system of canals.

The Province of Ontario is the section of the Dominion lying between the great lakes and Hudson Bay. A territory as large as New York, Pennsylvania, Ohio and Michigan combined might be cut out of it, and





MONTREAL.





there would still remain thousands of square miles. The exact limits have been for years a matter of dispute between the Dominion and Provincial governments, but, according to the award of the boundary commission, its boundary extends from the Lake of the Woods and Winnipeg River, along the English River, through Lac Seul and Lake St. Joseph and along Albany River to James Bay, the southern shore of which it follows to a point due north of Lake Temiscaming. Running down to Temiscaming, it follows the Ottawa River to a point within a few miles of Montreal, and then strikes over to Lake St. Francis and extends along the St. Lawrence River to Lake Ontario, whence it spreads along the whole length of the great lakes as far as Pigeon River which, rising near Rainy River, empties into Lake Superior.

Through the province from Lake Abittibe to Lake St. Joseph runs a height of land from 1,000 to 1,500 feet above sea level, on the southern slope of which are the sources of the rivers which empty into the great lakes and St. Lawrence River, while those flowing into Hudson Bay rise on its northern slope. The most peculiar natural feature of Canada is its system of river reservoirs, and this is most strikingly marked in the Province of Ontario. The rivers in general are very irregular in their course, and at almost every turn in them is located a reservoir in the form of a lake, the stretches of river between the lake reservoirs being each known by a different name. The system is shown on a large scale in the St. Lawrence River and the great lakes. The St. Lawrence proper may be said to begin at Montreal, the head of navigation for ocean vessels,

but the great river has its source somewhere in the wilderness of Northern Ontario and its first big reservoir is Nepigon, a large lake of pure blue water, the outlet of which is Nepigon River flowing into the second reservoir, Lake Superior. Between Nepigon and Montreal there are seven such reservoirs connected by stretches of the St. Lawrence River under different names. This peculiarity is imitated throughout the province by numerous other rivers, sometimes almost in miniature, sometimes on a scale nearly approaching that of the St. Lawrence and great lakes. Often the lake reservoirs of one irregular river are so close to those of another river system that a short portage, or a few miles of canaling, will shorten navigation by many miles.

At Sault St. Marie the level of Lake Superior is 591 feet above the St. Lawrence at Montreal, and the water reaches the lower level by one great fall at Niagara, and a series of rapids at different points which necessitated the construction of a number of canals. The Sault St. Marie rapids are avoided by a canal a mile long on the American side of the river, and a similar canal with a depth of eighteen feet at lowest water, is now being constructed on the Canadian side, and is to be completed in May, 1892. There are seven canals, between Lake Erie and Montreal, having an aggregate length of  $70\frac{1}{2}$  miles, with 53 locks, overcoming a height of  $533\frac{1}{4}$  feet. These canals were first designed for vessels drawing only nine feet of water, but some years ago it was decided to enlarge to a scale of fourteen feet. The Welland Canal,  $26\frac{3}{4}$  miles long, connecting Lakes Erie and Ontario, and the Lachine Canal,  $8\frac{1}{2}$  miles long, overcoming the Sault St. Louis, or Lachine rapids,

above Montreal harbor, have been enlarged to the new scale, but the five canals between them have only a depth of from nine to ten feet of water on the sills at ordinary water level, and at extreme low water the depth is reduced to seven feet in two of them. The work of enlarging the Cornwall Canal is well under way, and in a few years all the canals on this route will have the same depth as the Welland, so that vessels drawing 14 feet of water will be able to come to Montreal from Chicago, Port Arthur and Duluth. But so sure as any two sides of a triangle are together greater than the third side, vessels from Michigan and Superior will not always circumnavigate the south-western peninsula of Ontario to reach Montreal. The head of Georgian Bay is less than 123 miles from the Ottawa River. Between them stretch French River, Lake Nipissing, Lake Turtle, Lake Talon, Lake Trout and the Mattawan River. Less than eight miles of canaling would ensure a continuous waterway, but to enable large vessels to reach Montreal the Ottawa River canals would have to be enlarged.

Many years ago Mr. Walter Shanly, the well-known engineer, surveyed the route and estimated the cost of a waterway from Montreal to Georgian Bay, with a depth of twelve feet, at \$24,000,000, including the cost of enlarging the Lachine Canal, which was then of very limited capacity. A little later, Mr. T. C. Clarke, another eminent civil engineer, estimated that a waterway navigable for vessels drawing twelve feet of water could be made between Georgian Bay and Montreal at a cost of \$12,000,000, not including the cost of the Lachine Canal, which is already reconstructed on the

enlarged scale. The distance between Montreal and the mouth of the French River would be 430 statute miles, of which 30 miles would be canals with 69 locks. From the mouth of the French River to Sault St. Marie the distance is 190 statute miles, making the whole distance between Montreal and Sault St. Marie by this route 620 statute miles, as compared with 1,000 miles by the lakes and St. Lawrence River. The distance from Buffalo to Sault St. Marie is 600 miles. Thus, by taking the Ottawa route between Montreal and Lake Superior, vessels would save a voyage of nearly 400 miles through stormy lakes. There would be a similar saving in distance between Montreal and Chicago, and the two cities would be brought within 971 miles of each other, so that ocean vessels in the port of Montreal would be practically as near to the elevators of the great Western metropolis as the Erie canal boats at Buffalo.

It goes without saying that the carrying out of this scheme would give Montreal the control of the grain trade, and just below the point where the grain-bearing ships would reach Montreal island are the Lachine rapids, with power enough going to waste to run all the flour-mills in America. On the French and Ottawa rivers open navigation can be depended upon from May 5 to December 1, and the season is sometimes longer. The St. Lawrence route is open a little longer, but Mr. Walter Shanly estimates that vessels could make at least three trips more in a season between Chicago and Montreal by the Ottawa route than by the St. Lawrence route, owing to the shorter distance. The river between Montreal and Ottawa City is now

navigable for vessels drawing nine feet of water, the rapids being overcome by three short canals, having an aggregate length of  $6\frac{5}{8}$  miles, with eight locks. Above the capital city several locks and dams have been constructed to overcome rapids. It has been assumed that to compete with the St. Lawrence route the Ottawa canals must be made of the same dimensions as the new Welland—that is, fourteen feet deep, Mr. Clarke's estimate being for canals twelve feet deep. For my own part I am inclined to believe that a better plan would be to continue the Ottawa canals to Lake Nipissing on the present scale of nine feet, and enlarge the dimensions of the Sault St. Marie Canal to twenty or twenty-five feet. Then ships as large as the great ocean vessels could run between Lake Superior ports and French River, where they would transfer their cargoes to small steamers running down the Ottawa to Montreal. On this scale continuous navigation between Georgian Bay and Montreal could be established at comparatively slight cost, and the largest vessels that are now able to reach Montreal from the Upper Lakes could come down the Ottawa, for practically a canal system is only as large as its smallest lock, and some of the canals on the St. Lawrence route have not yet been enlarged, as already stated. Vessels drawing seventeen feet of water can pass from French River to Sault St. Marie by the sheltered channel north of the islands. There is a slight obstruction at one point, but it is to be removed this year. No doubt this channel could be made to accommodate vessels of the largest size. It would be worth while to consider whether connection could not be made between Nipissing and the Ottawa.



more cheaply by a ship-railway than by a canal. In connection with the Ottawa and Georgian Bay Canal scheme it has been proposed to construct a canal for vessels drawing nine feet of water from Caughnawaga, opposite the upper end of the Lachine Canal, to the Chambly Canal, which would be enlarged for a distance of about nine miles to the port of St. John's, Quebec, and it has been estimated that the whole work could be completed for about five million dollars. At considerably less expense a canal with a depth of seven feet could be constructed from Caughnawaga, and if the State of New York would enlarge the Champlain Canal to the same scale as the Erie, grain for New York could be loaded into barges at Montreal instead of at Buffalo, saving hundreds of miles of canalage as well as a long lake voyage. The distance from New York City to Montreal harbor would be 394 miles, of which  $105\frac{1}{2}$  miles would be by canal, and the remainder open navigation. The distance from New York to Chicago by this route would be about 150 miles shorter than *via* the Erie Canal and Buffalo. But the best scheme for a waterway between Montreal and New York seems to be the proposed canal from Longueuil, opposite Montreal harbor, to the Richelieu River. The distance would probably be a little shorter than by the Caughnawaga route.

On a summit of land between the Ottawa River and the lower end of Lake Ontario is a series of small lakes, some of which discharge their waters into the Rideau River, emptying into the Ottawa River at Ottawa City, while the others empty into Lake Ontario at Kingston through the river Cataraqui. By connecting and im-

proving these two river systems, continuous navigation for boats drawing  $4\frac{1}{2}$  feet of water has been established between Ottawa City and Kingston, a distance of  $126\frac{1}{4}$  miles. Even this canal is to a certain extent useful to Montreal as it furnishes an alternative route to Lake Ontario for small boats. The distance between Montreal harbor and Kingston by the Ottawa and Rideau route is  $248\frac{5}{8}$  miles, while by the St. Lawrence route it is only 178 miles, but not long ago when there was a breakdown on the Cornwall Canal, temporarily stopping navigation on the St. Lawrence route, the blockade was partially relieved by loading grain and other produce into Rideau barges. Another scheme to avoid the navigation of Lakes Ontario, Erie and Huron and shorten the distance between Montreal and Georgian Bay, is known as the Trent Valley Canal, in making which it is proposed to utilize the series of bays, rivers and small lakes which stretch across Ontario almost continuously from the Thousand Islands to Lake Huron, beginning with Quinte Bay, which extends from near Kingston to Trenton at the mouth of the Trent River, and ending with the Severn River, which flows out of Lake Simcoe into Georgian Bay. To connect the waters which drain into Quinte Bay, with those draining into Lake Simcoe, only  $13\frac{3}{4}$  miles of canal would have to be cut, but eleven small lakes and four rivers would be embraced in the scheme of navigation, and to overcome rapids several other very short canals are necessary. The distance between Quinte Bay and Georgian Bay by this route would be 235 miles. A good deal of money has already been expended in improving navigation on this Trent system of rivers and lakes, and

within a few years there will probably be navigation between Quinte and Georgian bays for boats drawing five feet of water. The western end of Quinte Bay has been connected with Lake Ontario by cutting through Murray Isthmus a canal without locks,  $4\frac{1}{2}$  miles in length, 80 feet wide and 11 feet deep at lowest water. The people of Toronto for many years discussed a proposal for a canal connecting Georgian Bay and Lake Ontario at Toronto, but this scheme seems to have been displaced by a project for a ship-railway which Mr. Kivas Tully is engineering. The distance from the mouth of the Humber at Toronto to the mouth of the Nottawasaga River, Georgian Bay, is 66 miles. The grades are said to be very favorable and it is estimated that a ship-railway with three tracks, capable of transporting a ship weighing 2,000 tons, including vessel and cargo, at the rate of ten miles per hour, could be constructed for twelve million dollars. This ship-railway would save hundreds of miles of dangerous lake navigation and 28 miles of canal between Chicago and Montreal, and its promoters claim that a vessel from Chicago, Port Arthur or Duluth, taking this route, could reach Montreal before one going around by Lakes Huron, St. Clair and Erie could reach Buffalo, and that even vessels bound for Buffalo would find it advantageous to pass through Toronto and the Welland Canal rather than go around by Detroit. Of course the successful operation of such a railway would be of great advantage to Oswego, as well as Toronto, but Montreal would probably derive the chief benefit. However, the construction of the Ottawa and Georgian Bay canals would be much more advantageous to Montreal, not

only because the route would be somewhat shorter, but also because it would completely avoid the attractions of Buffalo, Oswego and Ogdensburg. A vessel passing through Toronto might unload at one of the American lake ports, but a vessel passing through Ottawa must unload at Montreal. But whatever route ships from the North-west may ultimately take, it is certain that railway traffic from both the American and Canadian North-west will come down to Montreal through the Ottawa Valley. The Canadian Pacific Railway's short line to the "Soo" is already in operation, and is bringing an immense amount of American business to Montreal, while the Grand Trunk is likely to take the same short cut very soon, and other railways are sure to follow the example. But this is not the only short cut through Ontario for American traffic. The nearest way from Buffalo to any point in Michigan is through the south-western peninsula of Ontario, and for all the country which sends its exports to Europe through Chicago, the shortest route to the sea-board is by the Grand Trunk and Canadian Pacific lines, crossing Detroit Strait and passing through Southern Ontario to Montreal. Besides the through lines, Ontario has many local railways, most of which are branches of the two great trunk lines, and the southern part of the province is a net work of railways.

The Ottawa River above its tributary, Mattawan, has many lake expansions and one of them, Lac des Quinze, is not far from the height of land, on the other side of which lies Lake Abittibe. Between Lac des Quinze and Abittibe stretch several small lakes and rivers having a total length of about 66 miles, and the watershed between the two systems is less than a mile in

width. It would be worth while to have this route surveyed by skilled engineers to ascertain what it would cost to improve the upper Ottawa and connect it with Lake Abittibe, although it would not be advisable to undertake such a work until the northern country becomes populated. No doubt a waterway for barges of the Erie Canal scale could easily be made, and perhaps vessels of a larger class could be accommodated. The Abittibe River carries the outflow from Lake Abittibe down to James Bay at Moose Factory, meeting there the Moose River, which has two branches, the Matagami, rising in Lake Kenogamissie, and the Missinibe, flowing out of Lake Missinibe. Lake St. Joseph's outlet, the Albany River, empties into the bay at Fort Albany in latitude 52 degrees 8 minutes north, about one hundred miles north-west of Moose Factory. For six months of the year, all these rivers are navigable by large vessels for hundreds of miles. The Albany River has several navigable tributaries with numerous lake reservoirs, and these approach so close to both Long Lake and Lake Nepigon that it would not be very difficult to make connection with Lake Superior. Besides the Ontario rivers, James Bay receives from the west the Attahwahpiskat River of Keewatin, navigable for about 300 miles, from the east the East Main River, and from the south-east Lake Mistassini's outlet, the Rupert River.

James Bay is 300 miles long with a width of about 150 miles and is so shallow that, excepting a channel down its centre, the muddy bottom may be touched with an oar by a person rowing in a small boat, when almost out of sight of land, and in the southern part of it the water is so muddy that fish cannot live there, while it



is almost free from saline matter, owing to the volume of fresh water poured into the bay from the great rivers of which it is the outlet. The deep ship channel runs northward like a river in nearly a straight line from Moose Factory at the south of James Bay to Mansfield Island in Hudson Bay. Directly south of James Bay is a low, level, swampy basin bounded by distinct veins of hard rocks, the rim being high with a steep slope toward the centre, and the thought is suggested that this basin once contained a lake, which was the reservoir of all the rivers rising on the northern slope of Ontario's Height of Land, while what is now the ship channel of James Bay was a great river, carrying the waters of the lake through a long valley to Hudson Bay, receiving on its way several large tributaries. Such a lake, bursting from its bounds and spreading over the valley to the north of it, would form the shallow, muddy James Bay.

The climate of Ontario varies considerably according to latitude and elevation, but the variations are not so great as might be expected considering the vast area of the province. According to the records of the Dominion Meteorological Department for the seven years from 1882 to 1888 in Hamilton, at the head of Lake Ontario, the minimum temperatures averaged in January and February—11.8°; March—2.3°; April 16.8°; May 29.1°; June 37.8°; July and August 39.5°; September 32.5°; October 20.9°; November 10°; December—1.1°. The average of all temperatures for seven years was in January and February 21.7°; March 28.8°; April 42.3°; May 55.1°; June 64.1°; July and August 69.8°; September 62.6°; October 50.2°; November 38.5°; December 28.8. The



average of maximum temperatures for seven years was in April  $78^{\circ}$ ; May  $83.6^{\circ}$ ; June  $88.4^{\circ}$ ; July and August  $94.5^{\circ}$ ; September  $88.4^{\circ}$ ; October  $77.7^{\circ}$ ; November  $67.2^{\circ}$ . At Moose Factory, on the southern shore of James Bay at the far north of the province, the minimum temperatures for seven years averaged in January and February— $38.5^{\circ}$ ; March— $26.5$ ; April— $8^{\circ}$ ; May  $16.9^{\circ}$ ; June  $28.6^{\circ}$ ; July and August  $36.4^{\circ}$ ; September  $30.9^{\circ}$ ; October  $13.1^{\circ}$ ; November— $8.9^{\circ}$ ; December— $25.1^{\circ}$ . The average of all temperatures for seven years was in January and February— $0.8^{\circ}$ ; March  $11.8^{\circ}$ ; April  $25.2^{\circ}$ ; May  $43.9^{\circ}$ ; June  $52.4^{\circ}$ ; July and August  $60.9^{\circ}$ ; September  $51^{\circ}$ ; October  $39.1^{\circ}$ ; November  $21.3^{\circ}$ ; December  $9.9^{\circ}$ . The average of maximum temperatures for seven years was in April  $54.4^{\circ}$ ; May  $75.7^{\circ}$ ; June  $84.9^{\circ}$ ; July and August  $88.6^{\circ}$ ; September  $74.7^{\circ}$ ; October  $72.8^{\circ}$ ; November  $46.7^{\circ}$ . The greatest degree of cold experienced in an average winter at Windsor, near the southwestern corner of the province, is— $10^{\circ}$ ; Toronto— $16.1^{\circ}$ ; Ottawa— $26.9^{\circ}$ ; Owen Sound— $28^{\circ}$ ; Port Arthur— $35.6^{\circ}$ . The average of all temperatures during the months of January and February for the seven years was  $22.5^{\circ}$  at Windsor;  $19.6^{\circ}$  at Toronto;  $9.8^{\circ}$  at Ottawa;  $16.2^{\circ}$  at Owen Sound;  $2.8^{\circ}$  at Port Arthur. It will be noted that the temperature at Moose Factory, on the southern shore of James Bay, during the coldest winter months is not three degrees lower than that of Port Arthur, on Lake Superior. During the spring and early summer Port Arthur's temperature is five or six degrees higher, while in July, August, September and October the temperature at the two points is almost precisely the same. A slightly higher temperature prevails throughout the

district lying between the Height of Land and James Bay than at Moose Factory, but along the Height of Land the winters are somewhat colder, the difference in latitude being offset by the lower elevation as the country slopes toward James Bay. It is believed also that the many small lakes in this northern part of the province tend to moderate the climate. The thermometer never registers quite so low in the most northern part of Ontario as it does in Minnesota, Dakota, Montana or Manitoba, and, what is even more important, cyclones and blizzards are never experienced in any part of Ontario. Because Hudson Strait is blocked with ice in summer it is commonly supposed that any district bordering on Hudson Bay must be practically without summers, but when it is remembered that Hudson Bay is 825 miles long, while the strait to the north-east of it is 500 miles long, it can be imagined that the ice in the far north does not affect the south shore of James Bay to any great extent. In fact Hudson Bay proper never freezes over in winter, and, even as far north as Churchill, ice never extends far enough from shore to intercept the view of open water. The temperature of the bay is several degrees warmer in winter than that of Lake Superior. James Bay on account of its shallowness does freeze in winter, but the ice breaks up in the spring.

The population of Ontario, which is now estimated to be two millions and a half, is nearly all concentrated in the country south of Lake Nipissing, all of which is compactly settled, excepting the district between Georgian Bay and the Ottawa River, where the population is still sparse. The section between Lake Nipissing and Sudbury is being rapidly settled, little commu-

nities are growing up here and there along the line of the Canadian Pacific Railway from Sudbury to Port Arthur, and there is a small settlement between Lakes Temiscaming and Abittibe, but the whole country north of the Canadian Pacific Railway's main line may be described as a wilderness. Of the wilderness north of the Height of Land very little definite information can be had, but it is known to be heavily timbered, and from the reports of Government geologists and surveyors it is learned that while some parts of it are rocky and others swampy, there are vast areas of fertile land, while valuable minerals abound. The only settlers are the Hudson Bay Company's officers, and they do not devote much attention to agriculture, but there are small farms or gardens around nearly all their posts and from these some idea may be obtained of the agricultural possibilities of the country. At Moose Factory fine crops of oats, barley, peas, beans, tomatoes, turnips, potatoes, beets, carrots, cabbage, onions, lettuce, spinach and radishes are grown every year without any special care, and wheat has been successfully ripened there, but it is not usually grown at the Hudson Bay posts north of the fiftieth parallel of latitude, up to which point it is a regular crop. Strawberries, raspberries, gooseberries, red and black currants and huckleberries, grow in great profusion throughout the district. Owing to the abundant supply of water, the luxuriance of the native grasses and the adaptability of the soil and climate for root-growing, this part of the province is especially suitable to stock-raising and the dairy industry. However, the lumberman and the miner will probably be the pioneers, for the ordinary farmer pre-

fers a prairie farm in Manitoba or the Territories, to one that has to be cleared of trees before it can be ploughed. Coming south of the Height of Land to the sources of the Ottawa River, we find large areas of fertile land, and in the valley of the Blanche River there are estimated to be nearly 400,000 acres of clay land, suitable for cultivation, in one block. The country stretching from Lake Nipissing to the Lake of the Woods, and extending from the shores of Lakes Superior and Huron to the Height of Land, is known as the Algoma District, and has often been described by superficial observers as a worthless, rocky region, which must always prove an insurmountable barrier between Central Canada and the North-west. That it looks rocky and worthless, whether viewed from a steamship or from a railway car, cannot be denied, and the rocks are certainly there, but throughout this region are numerous little fertile valleys, sheltered from the rough winds by the much abused rocky hills, and watered by swift flowing rivers and pretty lakes. It is claimed that, owing to the protection afforded by the rocky hills and the moderating influence of the shallow lakes, these little valleys have a much milder climate than the lake shore, and that they are well adapted to growing hardy fruits, as well as grain and vegetables. It must be admitted that, these valleys being small, there is not much good land in any one spot, but altogether there are probably millions of acres available for cultivation between Nipissing and Port Arthur. West of that, along the Canadian side of the Rainy River, there are quite extensive tracks of good land. But the wealth of the region is in the rocks rather than in the soil, for there is reason to

believe that it is the richest mineral district this side of the Rocky Mountains. To describe in detail the discoveries of minerals that have been made, and give reasons for supposing that the whole district is enormously rich in minerals, would occupy a whole evening, but, for the benefit of those who wish to know more about Canadian minerals, it may be noted that Mr. H. B. Small, Secretary of the Dominion Department of Agriculture at Ottawa, who is a member of the American Institute of Mining Engineers, and has a wide reputation as a writer on Canadian subjects, is now engaged on a work giving complete information regarding all the mining districts and minerals of Canada, which will be published in New York this year. The iron deposits of Algoma are said to be even richer than those of Northern Michigan, silver has already been taken out in large quantities, gold has been found in many places, copper and nickel abound, and almost every other mineral excepting coal is known to exist there. Around Sudbury, a little to the north-west of Lake Nipissing, are most extensive deposits of the purest nickel. The Canadian Copper Company of Sudbury are mining and smelting it, and their output at the present time is equal to that of all the other nickel mines throughout the world, and it is said that, when the extensions shortly to be undertaken are completed, the output will be ten times that of all the other nickel mines of the world together. The importance of these mines lies in the fact that it has lately been discovered that five per cent. of nickel, added to steel, increases its strength over thirty per cent., while the alloy is practically non-corrodible, does not tarnish or rust, takes a



finer polish, and lasts longer than steel. In view of the fact that not more than 1,400 tons of nickel are produced in the world annually, apart from the output of the Sudbury mines, it seems evident that Canada must monopolize the nickel steel industry. On the east side of Georgian Bay, between French River and Simcoe, are the districts of Parry Sound and Muskoka, which contain some very good farming lands, but large tracts are almost worthless for agricultural purposes, owing to the prevalence of rocks. There are many pretty little lakes in these districts, and as fish and game abound they are much resorted to in the holiday season. So much for what is known as Northern, or New Ontario.

Old Ontario, the country south of a line drawn from a little north of Ottawa City, to the mouth of the Severn River, contains very little land unsuitable for cultivation, although there are some districts in the eastern counties where it would probably pay better to keep the land in timber. The whole of this region was once a great wheat country. Ontario farmers for years grew almost nothing but wheat, and by continual recropping many farms lost the elements necessary to the successful growth of wheat, while remaining well adapted to other crops. Nevertheless, there are still large areas of good wheat land under cultivation, and according to statistics collected by the Bureau of Industry of the Ontario Government, the average yield of wheat, barley and oats per acre is now higher than in any State of the American Union. Ontario barley has a continental reputation, and that grown around the Bay of Quinte and in some other sections of the province is acknowledged to be superior to any grown elsewhere in America, so that it commands



a price of its own in the markets of the United States. But grain growing is largely giving place to dairy farming and fruit growing. There are many fine herds of cattle throughout the province, and there has lately been a most extraordinary development of the cheese industry. Ontario leads the Dominion in cheese making, and in England the superiority of Canadian cheese to the American product is so well recognized that shipments from Canada always command several cents more per pound than those from the United States. The fact that, owing to the freedom of Canadian cattle from disease, they are allowed to enter England alive, while American cattle must be slaughtered on landing, has greatly stimulated stock-raising in Ontario, and thousands of head are shipped by way of Montreal every year. Apples and certain varieties of grapes can be grown anywhere in Old Ontario, but the fruit garden of the province is the south-western peninsula, lying between Lake Erie and Georgian Bay, and bounded on the west by the Detroit River, Lakes St. Clair and Huron. This district rivals the Annapolis Valley of Nova Scotia in the production of apples, and in the southern part of it peaches, pears, plums and the finest varieties of grapes, grow to perfection. Fruit is most extensively grown along the lake shore between Hamilton and Niagara, where there are thousands of acres of peach orchards. So warm is the climate there, that almonds have ripened in the open air at Niagara, and the fig has been successfully cultivated with very little protection in winter, and ripens two crops in the year, but of course it would not pay to raise figs and almonds for market. Indian corn is extensively cultivated,

Chinese sugar cane is successfully grown on a number of farms in the southern counties, and at Grimsby Mr. C. W. Wellington has had great success in raising African sugar cane, which he says is one of his best paying crops. Pelee Island on Lake Erie is the most southern point in Canada, and strange to say it has a milder climate than the part of Ohio lying directly south of it. This is attributed to the shallowness of Lake Erie waters which surround it. The island is noted for its vineyards, and it is said that cotton has been successfully grown there, but I have been unable to verify this. On the mainland Essex and Kent counties, lying between Lakes St. Clair and Erie, are particularly suited to the culture of grapes and peaches, and the apricot, quince and nectarine do well.

The mineral products of the peninsula are gypsum, salt and petroleum. Gypsum is mined in large quantities along the Grand River ; salt underlies an area of about 1,200 square miles of the counties bordering on Lake Huron, having an aggregate thickness of over 120 feet, but being separated into six successive beds by thin layers of rock. In Lambton and Kent counties, along Lake St. Clair, are the Ontario oil wells which were great gushers thirty years ago, and still yield millions of gallons of petroleum annually. The richest mineral district in Old Ontario lies back of Kingston and Belleville, extending towards the mines of Ottawa county, Quebec, in one direction, and towards Lake Nipissing in the other. Within this district, which may be regarded as a southern extension of the great mineral region of Northern Ontario, are found gold, mica, lead,

plumbago, phosphates, limestone and many thick beds of iron of superior quality.

Although Montreal is the ocean port of Ontario, Toronto is the hub of the province, of which it is the capital. Here are the chief law courts of the province, the Provincial University and a number of denominational colleges. Railways branch out from it in every direction. Its geographical position is not so good as that of Montreal, but every one of its citizens believes that it will be the chief city of the Dominion before the close of



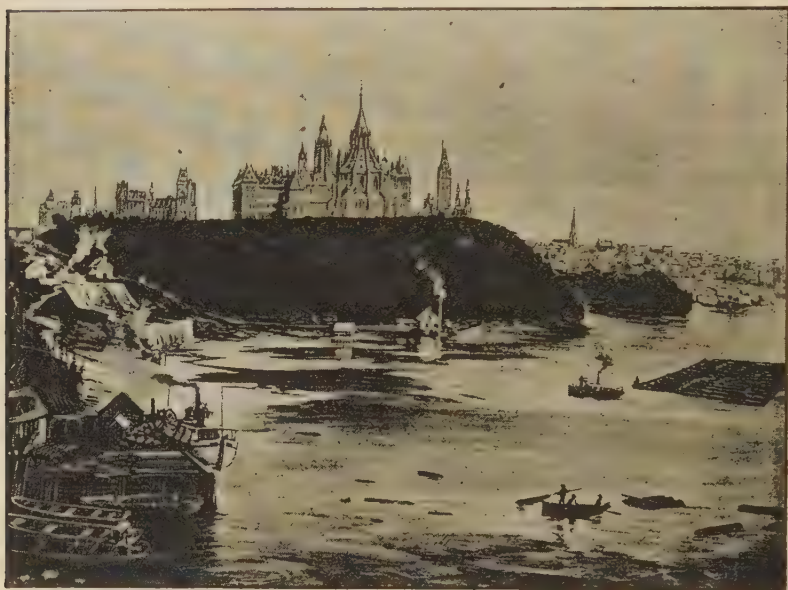
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the century. However this may be, it is growing in a most extraordinary way. In 1871 its population was 56,092; in 1881 it was 86,415; in December 1888, according to a special civic census, it was 172,000, and, as there are over 66,000 different names in the new city directory for 1890, there must now be at least 200,000 people in the city. At this rate of growth, it will not be many years before it ranks among the great cities of the world. There is never likely to be a very great city in the

western peninsula, because there are so many small cities which divide the trade between them. Of these the most important is Hamilton, a prosperous manufacturing town of nearly 50,000 inhabitants, situated in a pretty valley at the head of Lake Ontario, with a mountain at its back and a beautiful bay in front. This town has more manufactures in proportion to population than any other city in Canada. Kingston, at the east end of Lake Ontario, is not unlikely to become in future a great iron-making town, but it may have to compete for this industry with Ottawa, the capital of the Dominion, which is close to the most extensive iron deposits in Quebec, and within easy reach of those in Eastern Ontario, while it is nearer to the nickel mines of Sudbury. Ottawa, being situated by the Chaudière Falls of the Ottawa River, has one of the finest water powers in America. Its population last year was 40,000, as compared with 25,600 in 1881, an increase of 53 per cent. in eight years.

To reach the Canadian North-west from Montreal by the most direct route, one must take the main line of the Canadian Pacific, passing up the Ottawa Valley and striking north of Lake Superior to Port Arthur, on Thunder Bay, and thence to Winnipeg, but if it is desired to pass through Toronto, that city can be reached by either the Ontario and Quebec branch of the Canadian Pacific Railway, or by the Grand Trunk. From Toronto, a railway runs north connecting with the main line of the Canadian Pacific at Callander. From Sudbury the Canadian Pacific sends out a branch line to Sault St. Marie, where it connects with lines running to Duluth and St. Paul. In summer the monotony of an all rail

trip across the continent may be broken by taking passage on one of the magnificent steamships which the Canadian Pacific Railway runs between Owen Sound on Georgian Bay and Port Arthur. The distance from Owen Sound to Port Arthur is 520 miles, and the trip is made in 36 hours. By taking this route the traveller obtains many fine views of the savage scenery along the



PARLIAMENT BUILDINGS, OTTAWA.

north shore of Lake Superior, but nothing on the way equals in grandeur the approach to Port Arthur through Thunder Bay, with Thunder Cape towering over 1,300 feet above the lake on one side, and Pie Island rising nearly 900 feet on the other, while McKay mountain stands in the background beside the Kaministiquia River. Along the shore of Thunder Bay between the Current



and Kaministiquia rivers will grow up one of the great cities of Canada, including within its boundaries the rival towns of Port Arthur and Fort William. Already there are fine docks and the largest elevators in the world. Port Arthur, which is distant from Montreal 993 miles by rail, and 1,270 by water, is located in the centre of one of the richest silver fields in America, and in the vicinity are also found gold, lead, copper, and thick beds of iron ore associated with limestone, suitable for flux, while it will always be the chief distributing point for the vast mineral district of western Algoma, the riches of which have scarcely yet been touched ; but its importance will be chiefly due to the fact, that being the nearest lake port to Manitoba and the Canadian North-west, it will be the outlet of what is destined to be the greatest wheat producing region in the world. To get into this wheat region, one must travel to Winnipeg, 430 miles by the Canadian Pacific Railway through a rough country, which looks almost worthless from the car windows, but contains some areas of good land and minerals of considerable value, while the water powers at Rat Portage, Keewatin and other places are scarcely surpassed anywhere, and are already being utilized to run immense flour mills, one of which has a capacity of 800 barrels per day.

Port Arthur is not likely to be always entirely dependent upon the railway for transportation to Winnipeg, for an almost continuous waterway extends between the two cities and can easily be improved. The Kaministiquia River, which flows out of Dog Lake into Thunder Bay, and its tributary, the Mattawin, which comes from Lake Shebandowan, are both navigable, but on the Kaministiquia, about fifteen miles above



Fort William, occurs the wonderful Kakabeka waterfall, where an American syndicate have laid out a town plot and propose to establish flour mills rivalling those of Minneapolis. This waterfall can be avoided by a short canal or a boat railway, and then there will be continuous navigation between Port Arthur and Lake Shebandowan, which is 45 miles distant by the Dawson road. Lake Shebandowan is 18 miles long, and a portage of three-quarters of a mile connects it with Lake Kashebowie, 9 miles long. Another portage of one mile takes a boat over the Height of Land to Lac des Milles Lacs, which is  $18\frac{1}{2}$  miles long. From this lake to Rainy Lake there is a continuous chain of lakes and rivers, but navigation is interrupted at certain points, necessitating portages aggregating  $6\frac{1}{2}$  miles in length, the total distance between the two lakes being about 119 miles, including portages. From the head of Rainy Lake to the north-west angle of the Lake of the Woods, a distance of 164 miles, there is uninterrupted navigation for large vessels, except at Fort Francis, near the outlet of Rainy Lake, where a canal 800 feet long, to overcome the Kettle Falls, was cut through the solid rock some years ago, but the construction of the lock gates was deferred, and the work has never been completed. The Winnipeg River connects the Lake of the Woods with Lake Winnipeg. A system of canals, giving continuous navigation between Winnipeg City and Port Arthur to barges of the Erie Canal scale, could easily be constructed along this route, and it would probably be possible to make a waterway for vessels drawing nine feet of water. An alternative route might be secured by connecting the lake reservoirs of the Kaministiquia River with Lac des Milles Lacs,

Lac Seul and the Winnipeg River. No doubt, a ship canal between Lake Winnipeg and Lake Superior by either of these routes would be a very costly undertaking, but in connection with the Ottawa and Georgian Bay ship canal it would contribute in such an extraordinary way to the prosperity of the whole country, that a very large expenditure would be justified, for if vessels drawing nine feet of water could pass from Winnipeg to Montreal without breaking bulk, every bushel of grain produced in the North-west would have an increased value. Even a waterway for barges between Lake Superior and Lake Winnipeg would be of incalculable advantage to the North-west, for with such a system barges could be loaded all along the Saskatchewan, Red, and tributary rivers, transferring their cargoes to lake vessels at Port Arthur.

The country now known as the Canadian North-west extends from the western boundary of Ontario to the Rocky Mountains of British Columbia, and from the United States boundary to the Arctic Ocean. It has three great river systems, the Nelson and Churchill draining into Hudson Bay, and the Mackenzie draining into the Arctic Ocean. Besides the rivers included in these three systems, there are several important rivers flowing into Hudson Bay and the Arctic Ocean. The great reservoirs of the Nelson system are Lakes Winnipeg, Winnipegosis and Manitoba, which receive the outflow from the Lake of the Woods through Winnipeg River, as well as the waters flowing from the prairies through the channels of the Saskatchewan, Red and Assiniboine rivers and their affluents. The length of Lake Winnipeg is 300 miles, and that of Lakes Manitoba

and Winnipegosis 230 miles, while the rivers that flow into them from the Western prairies are navigable in the aggregate for 3,000 miles. There are a few boulders in these rivers, which can easily be removed, and at the mouth of the Saskatchewan a waterfall occurs, around which a short canal must be constructed. The Nelson River, which is the outlet of the system, is a large river, but at present is only navigable for fifty miles from its mouth, on account of rapids. The Hayes River, rising in a small lake south of Lake Winnipeg, has been much used by the Hudson Bay Company in transporting goods from Hudson Bay to Lake Winnipeg, connections being made by portages. The Nelson and Hayes rivers form estuaries at Port Nelson, and York Factory is located on a tongue of land between them. The estuary of the Nelson River is described by Commander Gordon as one of the most dangerous places in the world. There is no harbor, and he says it could not be made a desirable place for shipping by the expenditure of any amount of money. The Churchill River has for its reservoirs a host of small lakes between Lake Winnipeg and Lake Athabasca, including among others Isle la Crosse, Beaver, Reindeer, Wollaston and Indian. Port Churchill, at the mouth of the river, has the finest harbor in Hudson Bay, and the river is navigable for large vessels for many miles. The Mackenzie is almost as grand a system of lakes and rivers as the St. Lawrence. Its first reservoir is the Lesser Slave Lake, out of which flows the Lesser Slave River, emptying into Athabasca River, which discharges into Lake Athabasca. The Great Slave River connects Lake Athabasca with Great Slave Lake, out of which flows the Mackenzie

proper to the Arctic Ocean, being joined at Fort Simpson by the Liard River from British Columbia, and receiving still farther north the outflow from Great Bear Lake. The Mackenzie proper is 1,037 miles long, with an average width of one mile and a quarter, and there appear to be no obstructions to navigation throughout its course. Extending the name to the system of rivers of which it is the outlet, the Mackenzie is navigable for 1,360 miles for light-draught sea-going vessels, and without including the lakes there are 2,750 miles of navigation, suitable for stern wheel steamers which, with their barges, can carry 300 tons.

If the lakes be included, the Mackenzie system gives a total of about 6,500 miles of continuous lake coast and river navigation, broken only in two places by rapids which can easily be overcome by canals or tramways. One of these breaks is on the Great Slave River above Fort Smith, where navigation is obstructed by rapids, for about thirteen miles, while the other is on the Athabasca River, where there is one grand rapid extending for two miles, and several smaller ones, making navigation difficult but not impossible for over sixty miles; but the removal of a few boulders would probably make navigation safe except at the Grand Rapids, where a canal or boat railway would have to be constructed. The chief tributary of the Mackenzie is the Peace River, which, rising in the mountains of British Columbia, makes connection with the lower end of Lake Athabasca by means of the Quatre Fourches River, but empties into Great Slave River by another mouth, twenty-five miles below. In the spring, when the Peace River is high, the water runs out of the Quatre Fourches River into the

lake; in the summer, the water runs out of the lake into the river. From its mouth to the Rocky Mountains, a distance of 740 miles, steamboat navigation on the Peace River is only interrupted by rapids or waterfalls in two places, having an aggregate length of  $5\frac{1}{4}$  miles, which can easily be avoided by canals.

A wagon road 90 miles in length, from Athabasca Landing to Edmonton, connects the Mackenzie system with navigable water on the Saskatchewan, 813 miles from Lake Winnipeg, and it would not be a very costly undertaking to connect the Mackenzie and Nelson systems of navigation by a boat railway, capable of carrying small vessels across the portage in a few hours. The west end of Lesser Slave Lake is connected with Peace River, at its confluence with Smoky River, by a cart road 55 miles in length, and a canal or a boat railway along this route would save hundreds of miles of voyaging in going from Athabasca Landing to the Peace River district. Lake Athabasca could probably be connected with the Churchill system by canals, although the cost of such an undertaking would, no doubt, be great, and it is likely that a larger class of vessels could reach the Mackenzie from Hudson Bay by the Churchill route than by the Saskatchewan. However, it is difficult to obtain reliable information regarding the Lake country between the Churchill proper and Lake Athabasca.

When Champlain first reached the upper end of Montreal Island and saw the Ottawa River he exclaimed: "La Chine! This is the way to China!" That is why we call our Montreal Canal Lachine. The name will be justified when the St. Lawrence, Nelson and Mackenzie systems of navigation are connected, for then a small

steamer leaving Montreal harbor will pass through the Lachine Canal, up the Ottawa to Georgian Bay and by way of Port Arthur, Lake Winnipeg and the Saskatchewan to the Mackenzie, which it will navigate to the Arctic Ocean, where a larger steamer will be waiting to take the passengers through Bering Strait and across the Pacific to China. However that voyage will only be made occasionally by adventurers. The real utility of the Mackenzie connection with the Arctic will be to enable whalers, sealers and other fishermen to prosecute their business in the Arctic Ocean without taking the long and dangerous voyages which are now necessary. Vessels will be built and fitted out for Arctic fishing at some point on the Mackenzie River where timber is plentiful. They will winter in the Mackenzie River, and during the season of navigation will transfer their cargoes to small steamboats or barges at the head of ocean navigation on the Mackenzie, whence they will be sent down to Edmonton, Winnipeg, Port Arthur, Toronto and Montreal for distribution. And now as to the navigation of Hudson Bay. The navigation of the bay itself is an easy matter. The question is how to get out of the bay. Hudson Strait to the far north is blocked with ice for eight or nine months of the year, and even during the short season of navigation vessels are liable to be delayed by fields of floating ice. Rapid tidal currents often entangle vessels in running ice, and the difficulties of navigation are increased by the proximity of the magnetic pole, which makes the compass almost useless. The distance from Port Churchill to Liverpool by this route is only 2,900 miles, that is, about 100 miles shorter than from New York to Liverpool,



but the delays practically make the distance much greater. It is true the Hudson Bay Company have brought their supplies from Europe to the North-west through Hudson Strait for over a century, but it is not likely that this far northern route will ever become a commercial highway. But looking to the South instead of the North for an outlet, a vessel can pass down the ship channel of James Bay to Moose Factory, and from this point the great Abittibe River leads up to the Height of Land. No definite information is obtainable regarding the navigation of the river Abittibe, but probably some improvements would be necessary to enable vessels to reach Lake Abittibe, and a system of canals making connection with the Lower Ottawa would no doubt be very costly, but if navigation for vessels drawing nine feet of water could be secured between Port Churchill and Montreal for six months of the year, it would be of greater value to the North-west than difficult navigation of Hudson Strait for three months of the year. Of course this route to Europe would be longer than the northern one, but it would have the advantage of being on the way to the great manufacturing cities of Eastern Canada and the United States. Even if Hudson Bay had no outlet, this great inland sea would be of value to the North-west on account of its whale, seal and other fisheries. The fishing vessels coming down to Moose Factory from the North could transfer their cargoes to railways for shipment to Montreal.

The Canadian North-west embraces a prairie, a woodland and a barren region. The prairie region, which is drained by the Nelson system of rivers, lies between the international boundary and the 54th parallel of latitude,

being divided into three steppes, which slope gradually from the Rocky Mountains eastward toward the Red River and Lake Winnipeg. The lowest of these steppes is the Red River Valley with an average height of 800 feet, a width of 52 miles at the international boundary, and a total area of 55,000 square miles, of which nearly 14,000 square miles are covered with lakes. The second steppe has an average elevation of 1,600 feet above sea level, is about 250 miles wide at the 49th parallel, and has a total area of about 100,000 square miles. The third steppe has an average elevation of 3,000 feet, being 4,000 feet high at the foot-hills and 2,000 feet at its eastern edge, with a width of 465 miles at the international boundary, and a total area of 134,000 square miles.

Throughout the greater part of the prairie region there are clumps of trees here and there, and these are most numerous along the northern border of the plains. The woodland region lies within the basin of the Churchill and Mackenzie river systems, while the barren lands are north of the Churchill and east of the Mackenzie. While the slope of the plains is from the mountains eastward, the whole country slopes northward toward the Arctic Ocean, and this northward slope is so proportioned to the increasing latitude as to almost completely counteract the influence of the latter upon the climate, for hundreds of miles north of the international boundary. Besides the Province of Manitoba the Canadian North-west includes the district of Keewatin, extending along the western shore of Hudson Bay, the territories of Assiniboia and Saskatchewan, lying west and north-west of Manitoba, Alberta Territory west of Assiniboia and Saskatchewan, Atha-

basca Territory north of Alberta, and an unorganized territory without name, part of which lies west of the Mackenzie River and north of Athabasca, while the remainder lies between Keewatin and the Mackenzie River, and extends from the Churchill River to the Arctic Ocean. A great portion of this unorganized territory and the part of Keewatin north of the Churchill River seem to be unfit for human habitation, but this district is not utterly worthless, for its climate is most favorable to fur-bearing animals, the waters teem with fish, and the land is said to be underlaid with valuable minerals, so that in the distant future it may prove a source of considerable revenue to the Dominion. The southern part of Keewatin is not a wheat growing district, but oats, peas, barley and all kinds of vegetables are raised, and grasses grow with great luxuriance. But the real farming region of the Canadian North-west is in Manitoba and the organized territories west of it, the soil and climate being specially adapted to the production of enormous crops of grain and vegetables. Professor Macoun, the eminent botanist, who has made a most careful study of the climate and soil of the whole Canadian North-west, estimates that, after deducting lakes, rivers, swamps and bad lands, there are at least 150,000,000 acres of land suitable for growing the very finest grades of wheat. From forty to fifty bushels of wheat to the acre is a common yield, but the average is reduced by occasional losses from summer frosts and other causes. Extraordinary crops of vegetables are grown, and chicory is now being cultivated on an extensive scale by a Franco-Dutch company. It is said to be superior to any produced in Europe, and the yield last

year was 250 bushels per acre. The climate does not appear to be suitable for fruit growing, but the Government farms are experimenting with hardy varieties of apples from Northern Europe, and may succeed in introducing them. The climate of Manitoba is somewhat milder than that of Northern Dakota, the higher latitude of the former being more than offset by its lower elevation and its large lakes. Manitoba is less subject to blizzards, and in common with all Canada is entirely free from destructive cyclones. At Winnipeg the minimum temperatures for the seven years from 1882 to 1888, averaged in January and February—42.5°; March—30.6°; April—5.6°; May 24.6°; June 35.9°; July and August 37.8°; September 25.7°; October 12.4°; November—16.2°; December—37.7°. The average of all temperatures for seven years was in January and February—7.7°; March 10.3°; April 35.9°; May 51°; June 62.7°; July and August 63.6°; September 38.7°; October 19.9°; December 1.8°. The maximum temperatures during seven years averaged for April 65.9°; May 79°; June 86.6°; July and August 89.8°; September 78.3°; October 70.9°. The atmosphere in winter is dry, clear and full of ozone, while there is seldom any wind, so that the cold does not penetrate the body as does that of moist climates where the thermometer never registers below zero; but the ears must be kept covered and the nose frequently rubbed, for exposed parts of the person freeze very quickly.

As we move west from Manitoba the climate grows milder, and the area of habitable territory widens and extends nearer to the North Pole. In Alberta the thermometer sometimes registers nearly as low as in Mani-

toba, but the average winter temperature is much higher, for the cold never lasts long, being dispelled by Chinook breezes. At Calgary, Alberta, the minimum temperatures for the seven years from 1882 to 1888, averaged in January and February— $36.8^{\circ}$ ; March— $12.3^{\circ}$ ; April  $10.6^{\circ}$ ; May  $21.8^{\circ}$ ; June  $30.7^{\circ}$ ; July and August  $32.2^{\circ}$ ; September  $25.8^{\circ}$ ; October  $5.8^{\circ}$ ; November— $13.3^{\circ}$ ; December— $20.5^{\circ}$ . The average of all temperatures for seven years was in January and February  $10.3^{\circ}$ ; March  $27.7^{\circ}$ ; April  $39.9^{\circ}$ ; May  $49^{\circ}$ ; June  $56^{\circ}$ ; July and August  $58.8^{\circ}$ ; September  $49.2^{\circ}$ ; October  $39.2^{\circ}$ ; November  $27.9^{\circ}$ ; December  $15.3^{\circ}$ . The maximum temperatures averaged in April  $70.7^{\circ}$ ; May  $80.2^{\circ}$ ; June  $87.5^{\circ}$ ; July and August  $88.7^{\circ}$ ; September  $81.5^{\circ}$ ; October  $76^{\circ}$ . In the Mackenzie River district wheat is grown successfully on the 60th parallel of latitude; barley, rye and oats can be grown farther North, and potatoes are raised within the Arctic Circle. In 1888 a committee of the Dominion Senate, after examining many witnesses, including farmers, hunters, traders, missionaries and scientists, reported that north of the Nelson River system, and within the basin of the Mackenzie system of rivers, the climate is suitable to the growth of potatoes over an area of 656,000 square miles, to the growth of barley over an area of 407,000 square miles, and to the growth of wheat, over an area of 316,000 square miles. There is estimated to be a pastoral area of 860,000 square miles, 26,000 square miles of which are open prairie with occasional groves, the remainder being more or less wooded, and 274,000 square miles may be considered arable land, while about 400,000 square miles of the total area between the Nelson system and the Arctic



Ocean are useless for the pasturage of domestic animals and for cultivation. Throughout the arable and pastoral area, latitude bears no direct relation to summer isotherms, the spring flowers and the buds of deciduous trees appearing as early north of Great Slave Lake as at Winnipeg or St. Paul, and earlier along the Peace and Liard rivers and some of the minor affluents of the great Mackenzie River. Professor Macoun says that spring advances from north-west to south-west at the rate of about 250 miles per day, and that winter begins in Manitoba and goes westward at the same rate. Many reasons are assigned for the warm summers in the far North-west. The elevation of the country is thousands of feet lower than at the American boundary, the Rocky Mountains are also lower, and there are many passes in them through which come warm Chinook breezes from the Pacific, while the numerous lakes in the district favorably affect the temperature, and in the summer there is almost no night there. An American writer has called all Canada "Daylight Land" because of our long summer days. The title is not at all appropriate as regards South-eastern Canada; it seems apt when we reach the prairies of Manitoba, but one must live in the valley of the Peace River from the middle of April until the middle of September to realize that Canada is indeed the land of daylight. Of course long summer days are offset by long nights at mid-winter, and during the season of darkness some very cold weather is experienced. At Fort Dunvegan, in latitude 56° North, the minimum temperatures for the seven years averaged in January and February—56.9°; March—31.4°; April—6.3°; May 22.3°; June 27.8°; July and August



31.7°; September 22.7°; October 12.9°; November—14.6°; December—41.5°. The average of all temperatures for seven years was in January and February 4 8°; March 15.2°; April 34.2°; May 50.1°; June 56°; July and August 58.9°; September 45.7°; October 31.6°; November 16.5°; December—9.1°. The maximum temperatures for seven years averaged for April 67.2°; May 80°; June 82.3°; July and August 87.5°; September 74.5°; October 61°. At Fort Liard, in latitude 60° North, the climate is said to be better than at Fort Dunvegan. In addition to the agricultural resources of the Mackenzie Basin, the Senate Committee report the existence of extensive deposits of coal as well as iron, gold and many other valuable minerals, and it is believed to contain the most extensive petroleum field in the world, while the numerous lakes and rivers all swarm with edible fish. The southern part of this district now forms the Territory of Athabasca, and it is likely to become in course of time one of the most populous provinces of Canada. In former days the buffaloes made the Bow River district of Alberta Territory their headquarters, finding there warm Chinook breezes, luxuriant grasses and many streams of crystal water. From this point they ranged in countless millions as far north as the Peace and Liard rivers in Canada, and southward over the plains of the Western States. Now the buffaloes have gone, but in the ranches of the Bow River Valley hundreds of thousands of cattle, horses and sheep stay out all winter without shelter and find food for themselves. The climate of Manitoba and the territories adjoining it is not suitable to ranching, but there are some fine stock farms in those provinces. In Western Manitoba and Assiniboia are found beds of lignite.

which improves as we go westward, becoming semi-bituminous coal at Lethbridge in Alberta, where the Galt mines are located, bituminous coal of good quality at Mitford and Canmore, twenty-five miles west of Calgary, and anthracite equal to the best produced in Pennsylvania at Anthracite, five miles east of Banff, on the borders of British Columbia. Iron and many other minerals are found in the mountains close at hand, so that a great iron-making town will no doubt grow up somewhere in this district. The coal of Alberta is estimated to cover an area of 40,000 square miles, and this is believed to be only the southern rim of a great coal field, of which Edmonton in Saskatchewan Territory is supposed to be the centre.

Where the chief city of the Canadian North-west will be is as yet a matter of conjecture. Winnipeg, the capital of Manitoba, is at present the metropolis, and it may keep the lead, although many people predict that the great city will be farther west. It is already a railway centre of some importance, and is almost certain to eventually become a large city. Other towns of promise along the line of the Canadian Pacific Railway are Brandon and Portage la Prairie in Manitoba, Regina and Medicine Hat in Assiniboia, Calgary and Canmore in Alberta, while Edmonton and Battleford in Saskatchewan are waiting for another transcontinental railway. A prosperous town may grow up at Banff, close to the Canadian National Park with its grand mountain scenery, pretty lakes, beautiful walks and drives, and famous medicinal hot springs.

The Province of British Columbia is the wonderland of Canada. Within its boundaries are reproduced all

the varied climates of the Dominion and almost every natural feature, while there are some local varieties of climate and landscape that cannot be found elsewhere. Its lofty snow-capped mountains, lovely valleys, pretty lakes, and much indented coast, combine to make it the most beautiful section of Canada, and there is reason to believe that its natural resources are greater than those of any other province. Extending from the Canadian North-west territories to the Pacific Ocean and from the United States boundary to the sixtieth parallel of latitude, with Alaska at the North-west and the unorganized North-west territory of Canada at the north-east, it has an area of over 390,000 square miles. The Olympian mountains rise out of the ocean in Vancouver and Queen Charlotte Islands, while on the mainland there are the Rockies, the Gold and the Coast Ranges with long plateaus between them. The Gold Range is a broken mass of mountains, known in different parts of its length as the Purcell, Selkirk, Columbia, Cariboo, Omenica and Cassiar mountains, but the name Gold Range is sometimes especially applied to the Columbia mountains. The mountains of the interior gradually slope northward and trend to the west, finally becoming merged in the Coast Range. The highest peaks are near the head waters of the Bow, North Saskatchewan and Athabasca rivers, culminating in Mount Brown with a reputed elevation of 16,000 feet.

British Columbia has often been called a "sea of mountains," sometimes in patriotic admiration, sometimes in contempt. Speaking of a "sea of mountains" in "The Land of Waterways," the thought naturally arises, can this sea be navigated? The valleys between

the mountains have been called the troughs of the sea, and through these valleys flow many large rivers with numerous lake reservoirs, fed by streams from the mountains. There are many stretches of navigation, some of them hundreds of miles in length, but at certain points continuous navigation is interrupted by rapid descents and narrow cañons, through which the rivers rush.

The lakes are all long, narrow and deep, while the principal rivers are noted for their peculiar bends. The best illustration of this peculiarity is found in the Kootenay and Columbia rivers which run around the part of the Gold Range known as the Selkirks. The Upper Kootenay River, coming down from the Rocky Mountains, reaches the valley and becomes navigable just one mile away from the Upper Columbia Lake. The level of the Columbia Lake is ten feet lower than that of the Kootenay River, and the watershed between them is a level, gravel flat, having a gradual slope to the lake. Under such circumstances the river might be expected to flow into the lake, but instead of doing so it turns south, runs down through the valley between the Rockies and the Selkirks, crosses the international boundary, bends around the mountains, turns north again and, re-entering Canada, flows up the lower Kootenay Valley between two arms of the Selkirks, and terminates in a beautiful lake, ninety miles in length. The elevation of the Lower Kootenay Valley is only 1,750 feet above the sea, being about 600 feet lower than the Upper Valley, and directly opposite the point, where the Kootenay River should have joined the Columbia in the first place, it flows out of Kootenay Lake through a narrow

gorge twenty-five miles in length, and enters a third valley 800 feet lower down, there joining the Columbia, which has reached the same place after making a long northward bend around the Selkirk Mountains. The united rivers then cross the international boundary, and flow to the Pacific through American territory. In summer the Kootenay River is navigable for small steamers throughout its course in the valleys, except at its south-eastern bend in the United States, where there is a one-mile portage to overcome rapids. From Bonner's Ferry, about ten or twelve miles south of the international boundary, to Kootenay Lake, a distance of eighty miles, the river is from six hundred to seven hundred feet wide, with an average depth of forty-five feet, and there is not a place in it where the largest ocean vessels would not float with ease.

The great bend of the Columbia is made unnavigable by cañons, but steamers run from Golden City on the Canadian Pacific Railway to the lower Columbia Lake, and the Dominion Government is about to make improvements in the channel between the two lakes, which will enable steamers to reach the head of Upper Columbia Lake. From this point to the Kootenay River a canal is now being constructed across the low watershed already described, which will ensure continuous navigation for 250 miles, and if the American Government would construct a canal one mile in length at the southern bend of the Kootenay, there would be continuous navigation for steamers from Golden City to the Kootenay Lakes, a distance of over 400 miles. In the Lower Columbia Valley, the Columbia with its Arrow Lake expansions is navigable for many miles.



The Fraser River, rising farther north in the same plateau as the Columbia, bends around the Cariboo Mountains and flows down to the Pacific between the Gold and Coast ranges. It is now navigable as far as New Westminster, fifteen miles from its mouth, by large ocean vessels, and river steamers ascend as far as Yale, 110 miles from the mouth. Above Yale there are several stretches of navigation, separated from each other by narrow cañons, enclosed between precipitous mountains, through which the river rushes in foaming torrents. At God's Lock Gate the river contracts to a width of ten feet, and of course the current is of extraordinary force. There does not appear to be room between the mountains to construct canals around these torrents, and it is altogether improbable that continuous navigation can ever be secured. However, Mr. D. W. Pearse and Mr. G. B. Wright, engineers employed by the Dominion Department of Public Works, after a careful survey estimate that in many of these cañons obstructions can be removed which will widen the channel, and that by an expenditure of \$200,000 navigation for steamers can be secured from a point 110 miles above Yale to Cottonwood Cañon, a distance of 210 miles. The principal tributary of the Fraser River is the Thompson, which, with its lake reservoirs Kamloops and Shuswap, is navigable for many miles.

The Parsnip River, the upper branch of the Peace River, rises near the bend of the Fraser, and there is only a short portage between them. Boats carrying five or six tons have been taken all the way up the Fraser, carried across the portage, and floated down to the Peace River and up its tributary River Omenica. The Parsnip



and Peace rivers, although rapid streams in the mountains, are said to be navigable for stern wheel steamers, for several hundred miles before the descent to the plains is made in a series of rapids extending for about eighty miles, the total fall being about one thousand feet, after which the river flows slowly for 740 miles to the MacKenzie, as already described.

There are many navigable rivers in the north, including the Skeena and Stickeen rivers, which empty into the Pacific, and a number of long ones which are tributary to the Yukon River.

As the mountains extend along the coast, the various inlets may be included in the mountain navigation. The coast navigation may best be described in the words of Lord Dufferin, who said: "Such a spectacle as its coast line presents is not to be paralleled by any country in the world. Day after day for a whole week in a vessel of nearly 2,000 tons, we threaded an interminable labyrinth of watery lanes and reaches, that wound endlessly in and out of a network of islands, promontories, and peninsulas for thousands of miles, unruffled by the slightest swell from the adjoining ocean, and presenting at every turn an ever shifting combination of rock, verdure, forest, glacier and snow-capped mountain, of unrivalled grandeur and beauty. When it is remembered that this wonderful system of navigation, equally well adapted to the largest line-of-battle ship and the frailest canoe, fringes the entire sea-board of the Province, and communicates, at points sometimes more than a hundred miles from the coast, with a multitude of valleys stretching eastward into the interior, while at the same time it is furnished with innumerable harbors on either hand,

one is lost in admiration at the facilities for intercommunication, which are thus provided for the future inhabitants of this wonderful region."

So we may truthfully say that Canada's "sea of mountains" is navigable, but nevertheless navigation is of such a local character that the Province was entirely isolated from the rest of the Dominion until the Canadian Pacific Railway went through. For many years the Canadian Rockies were considered impassable, but eleven passes have now been discovered and explored, the highest being the South Kootenay, with an elevation of 7,100 feet at the international boundary, and the lowest the Peace River Pass, with an altitude of 2,000 ft., in latitude 56 degrees North. The pass first selected by the Government for the Canadian Pacific Railway was the Yellowhead, where the altitude is 3,733 feet, and the maximum grades would be only one per cent., but in order to reach this pass the line of the railway would have to be deflected very far north from Medicine Hat, and it was finally decided to adopt the Bow River, or Kicking Horse Pass, where the altitude is 5,300 feet, and the maximum grades 116 feet per mile. There are two stretches of the road at present where the grade is four and one-half per cent., but these sections are only temporary, the permanent line along the face of Mount Stephen, with maximum grades of two and a half per cent., being very difficult of construction. The length of the railway from the eastern slope of the Rockies to the Pacific coast is 522 miles, and all the gradients exceeding one per cent. are upon the 134 miles between the head waters of the Bow River in the Rockies, and a point near Albert cañon of the Illecillewaet River in the Selkirks.

Climbing the mountains of British Columbia it is easy to understand how the low elevation of the Canadian North-west gives it a milder climate than the adjoining States and Territories, for above an elevation of 6,000 feet in this latitude snow falls during every month of the year, so that the higher peaks are always capped with snow, and magnificent glaciers can be seen at various points along the line of the Canadian Pacific Railway, those of Mount Stephen and Mount Sir Donald being particularly grand. In this elevated section of the Canadian Pacific Railway there are six miles of snow-sheds, not continuous of course, but situated where required for protection, and another mile of them will have to be constructed. This is the only part of the railway where much trouble is experienced with snow, and having such a short distance to protect, as compared with the highly elevated American lines, the Canadian Pacific Company can afford to expend a great deal of money on strong snow-sheds and other contrivances for preventing blockades, so that the line is kept open and the trains run on good time, when the American trans-continental railways are blocked with snow for hundreds of miles. However, to guard against possible blockades, nine provision magazines have been located about ten miles apart along the elevated section, so that in case of delay there will always be ample supplies of food for passengers and train hands. There are also store-houses for coal, oil, etc., and the various materials required for repairing tracks and bridges. After the Canadian Pacific line was constructed, it was discovered that the Crow's Nest pass of the Rockies, almost directly in line with both Medicine Hat and Vancouver

City, is only 4,830 feet high ; the grades are said to be easier all along the route, and as it is much more direct than the line adopted, there is very little doubt that the Canadian Pacific Company will eventually send a branch through the Crow's Nest, passing down the fertile valleys of the Kootenay and Columbia rivers to Vancouver City, and shortening the distance between the two oceans by about 200 miles.

Every square mile of British Columbia may be said to have its own climate, and it would be impossible to give a general description that would apply to the whole province. The climate is very mild along the coast, the most northern districts having a temperature similar to that of Scotland, while the southern coast climate probably more nearly resembles that of the south-western counties of England than any other part of America. At New Westminster, at the mouth of the Fraser, according to the meteorological records for the seven years from 1882 to 1888 inclusive, the lowest temperature in January of an average winter is  $17.4^{\circ}$  ; in March  $27.6^{\circ}$  ; April  $31.3^{\circ}$  ; June  $44.9^{\circ}$  ; July and August  $45.7^{\circ}$  ; September  $41.2^{\circ}$  ; October  $29.8^{\circ}$  ; November  $25.2^{\circ}$  ; December  $18.6^{\circ}$ . The average of all temperatures in January and February is  $35.3^{\circ}$  ; March  $40^{\circ}$  ; April  $48.2^{\circ}$  ; May  $54.3^{\circ}$  ; June  $58.3^{\circ}$  ; July and August  $62^{\circ}$  ; September  $56^{\circ}$  ; October  $48.1^{\circ}$  ; November  $40.5^{\circ}$  ; December  $34.5^{\circ}$ . The maximum temperature was  $70^{\circ}$  in April ;  $78.3^{\circ}$  in May ;  $81.2^{\circ}$  in June ;  $85.7^{\circ}$  in July and August ;  $78.1^{\circ}$  in September ;  $67.2^{\circ}$  in October and  $54.4^{\circ}$  in November. Observations for seven consecutive years show that the rainfall in January, including snow reduced to water, averages 8.16 inches ; February

7.1 inches; March 6.27 inches; April 2.92 inches; May 3.49 inches; June 2.32 inches; July 1.78 inches; August 1.96 inches; September 3.44 inches; October 5.7 inches; November 6.95 inches; December 9.48 inches, making a total annual precipitation of nearly 60 inches, including snow, which seldom falls. This may be taken as a fair sample of the climate of the part of the mainland coast in the vicinity of Vancouver Island. The south-eastern portion of Vancouver Island has about the same temperatures, but the rainfall is considerably less, while along the western coast of Vancouver Island and all along the northern mainland coast the rainfall is much greater.

The plateau between the Gold and Coast Ranges has about the same mean annual temperature as the coast in the same latitude, but the extremes of heat and cold are greater, while the climate is very dry. In the higher plateau between the Gold Range and the Rockies the climate is colder, approximating to that on the eastern slope of the Rockies. In some parts of this plateau rain falls almost continually in summer, and the snow fall in winter is very heavy, while in other sections of the same plateau it is comparatively dry. For example, the upper valley of the Columbia near the bend has a very great rainfall, but in the vicinity of the Columbia lakes the rainfall decreases, and the upper Kootenay Valley in the same plateau has a dry climate. Owing to the mountainous character of the country the area of agricultural land is small in proportion to the size of the province, but there are estimated to be at least seven million acres of arable land, while the area suitable for pasturage is immense. Where the land can be

cultivated it is very rich, and the climate is so varied that every fruit, vegetable, plant and flower known to the temperate zone can be produced to perfection. The greatest obstacle to the cultivation of the soil and development of the agricultural wealth of the province is the immense size of the trees, which makes the clearing of wild land too costly an undertaking for the ordinary farmer. Except on the mountain peaks, the whole province is covered with timber. There are 30 species of trees, and some of them grow to an extraordinary size. The Douglas fir frequently grows to a height of 300 feet, having a diameter of from eight to nine feet, while some of the cedars have a diameter of 17 feet.

Almost every known mineral has been discovered in British Columbia and the colors of gold have been found in all the rivers and streams from the international boundary to Alaska. As yet there has been almost no quartz mining, but the placer miners have taken out of the rivers and streams over fifty million dollars worth of gold. When quartz mining is begun on an extensive scale, the yield of gold will probably be enormous. Silver, copper and lead are found in large quantities in various sections, while iron and coal are very widely distributed both on the mainland and the islands. The anthracite of Queen Charlotte Islands compares favorably with that of Pennsylvania, and according to tests made by the United States War Department, the bituminous coal of Vancouver Island is far superior to any coal on or near the Pacific coast, south of the international boundary. The most important deposits of iron yet known in British Columbia are those of Texada Island, between Vancouver Island and



the mainland. It is magnetite of superior quality, associated with limestone suitable for flux, contiguous to good harbors and close to the great coal beds of Vancouver Island. Texada Island is one of a group lying between Vancouver Island and the mainland. The channels between the islands and the mainland are not too wide to be bridged, and a railway will no doubt pass over to Vancouver Island this way in the course of time.

The wealth of British Columbia's fisheries cannot be estimated. Salmon swarm along the coast and ascend the rivers in myriads, climbing over rapids and waterfalls, and swimming through the torrents of the cañons, to be caught 600 miles in the interior. Black cod, herrings, halibut, sardines, smelts and oolachan abound along the coast, oysters thrive, and the seal fisheries of Bering Sea are accessible, while in the interior of the province sturgeon, trout, pike, perch and white fish, as well as salmon, are numerous in the rivers and lakes.

The farms, the forests, the mines and the fisheries of British Columbia will give employment to millions, but the chief industry of the province must eventually be manufacturing. With numerous water-powers, unlimited supplies of iron and coal of the best quality, and inexhaustible forests of the finest timber, no country is better suited for iron-making and wood-working industries, while the climate is especially adapted to the manufacture of textiles. It is well known that a moist climate is essential to the successful manufacture of the finest grades of cotton and woollen goods, and every variety of climate, from dry to wet, can be found within a few square miles in the southern part of British

Columbia, so that the manufacturer can select exactly the climate to suit his purpose. Raw cotton can be imported from Australia or India, and wool from New Zealand can be mixed with the wool produced in British Columbia. All kinds of manufactured goods will be sent to Japan, China, Australasia, India and South America, and a large Russian trade may possibly be developed. In fact, the geographical situation of British Columbia is most favorable for trade with all the countries of the Pacific and Indian Oceans. A British manufacturing establishment, with a large trade in the East, by moving the works and workmen from England to the southern coast of British Columbia, would save nearly one thousand miles of carriage in shipping goods to Singapore, between three and four thousand miles in shipments to Hong Kong, over seven thousand miles in shipments to Yokohama, about six thousand miles in shipments to Auckland, New Zealand, and about five thousand miles in shipments to Sydney, Australia, while the distance to Calcutta would be very little greater than from England.

While there are first-class harbors all along the Pacific coast of Canada, and the climate is so mild that none of them are ever blocked with ice at any season of the year, it is generally conceded that those of Burrard Inlet, on the mainland, and Esquimalt, on Vancouver Island, are the best. Burrard Inlet, being most accessible for railway purposes, has been chosen as the Pacific terminus of the Canadian Pacific Railway, and on a peninsula at the mouth of this inlet, with water almost all around it deep enough to float the largest ocean vessels, the terminal city, Vancouver, is being built. The name of the town has

been stolen from the adjoining island, much to the indignation of its inhabitants. In 1884 the land on which Vancouver City stands was a wilderness covered by gigantic forest trees; in 1885 the Canadian Pacific Company selected it as the terminus, but the railway did not reach it until 1887. In 1886, when the town had a population of 2,000, it was completely destroyed by fire, only two or three houses being saved. Now it is a solidly built city, with an estimated population of over 15,000. The founders of the city took precautions to prevent land booming, building conditions being imposed in almost every land transaction, so that its growth has been steady and solid. There is very little doubt that Vancouver will eventually become the greatest city on the Pacific coast of America. Ocean vessels in the harbor of Vancouver are 2,906 miles from ocean vessels in the harbor of Montreal, and the distance from Liverpool to Hong Kong is nearly 1,200 miles shorter by way of Montreal and Vancouver than by way of New York and San Francisco. The distance from Liverpool to Vancouver City *via* St. John, N. B., and the Canadian Pacific Railway, is 6,470 statute miles, and *via* Quebec 6,120 miles, while the distance to San Francisco by the shortest American route is over 6,700 miles. The distance from New York to Vancouver *via* Brockville is 3,162 miles, while the shortest American route from New York to San Francisco is 3,271 miles, and Boston, which is 3,397 miles from San Francisco by the shortest American route, is only 3,222 miles from Vancouver *via* the Canadian Pacific Railway. The sailing distance from Vancouver to Yokohama and Hong Kong varies somewhat according to different estimates, but all of them

concede that the Canadian city has the advantage of San Francisco by several hundred miles. According to a report of the Canadian Minister of Public Works, the distance from Vancouver to Yokohama is 4,362 geographical miles. But it is on the return trip that Vancouver is peculiarly favored. The Japan Current flows swiftly toward the Pacific coast of Canada, practically shortening the distance by hundreds of miles, and even vessels bound for San Francisco save time by going with it toward British Columbia. It might be supposed that ships from Vancouver bound for Japan or China would have this current against them, but in fact it bends northward somewhat after the manner of a British Columbia river, so that the direct sailing course between Vancouver and Japan does not lie in its way. Vancouver is distant from Sydney, Australia, 6,829 miles, from Auckland, New Zealand, 6,934 miles, and from Singapore 7,376 miles.

Victoria, at the south-east of Vancouver Island, is the capital of British Columbia. Its situation is beautiful, and the climate almost perfect, but the harbor is not particularly good. However, Esquimalt harbor, which is equal to those of Burrard Inlet, is only three miles away, and the city will eventually extend to it.

Esquimalt is the headquarters of the British fleet in the Pacific, and the Dominion Government has built a fine dry dock there. This harbor will some day be the terminus of another Canadian Pacific Railway, which may be called for convenience the Canadian Interocean Railway. This line will cross to the mainland at Bute Inlet by bridging the channels between the islands, and run through the Rockies *via* the Yellow Head pass. It

will probably make connections with Vancouver City as well as Esquimalt, and taking the shortest route to Quebec City, St. John, N. B., and Louisburg, C. B., with a branch line down the Ottawa Valley to Montreal, it will be the air line between the two oceans, will have easier grades than the Canadian Pacific Railway and run through a fertile country nearly all the way. For the present the Canadian Pacific Railway serves the country very well : not only is it the shortest line across the continent, but its elevation is so much lower than that of the American lines and its grades as a rule so moderate that, even if the distance were the same, better time could be made and freight hauled at less expense, especially in winter when the highly elevated American lines are often blocked with snow. Already a mail bag has gone around the world in sixty-nine days by the Canadian route, and it is believed that when fast lines of steamships are running on both oceans in connection with this railway, the journey around the world can be made in sixty days.

If the Atlantic and Pacific formed one great ocean instead of being divided by the American Continent, the route of ships would undoubtedly be directly across the part of the globe now occupied by the Dominion of Canada, in order to take advantage of the shorter parallels of latitude.

Before the completion of the Canadian Pacific Railway, this great body of land was an impassable obstacle in the way of direct commerce between Europe and Asia, but now it merely serves to hasten the passage and break the monotony of a long sea voyage. The ship, transferring its cargo and passengers to the railway,

makes shorter voyages, requires less coal, and is therefore able to carry larger cargoes, or utilize the coal in increasing its rate of speed. In winter the ship from Europe seeking a port of trans-shipment will find in the maritime provinces of Canada some of the finest harbors in the world, hundreds of miles nearer home than any port of the United States, and close to inexhaustible supplies of first-class coal. In summer it can pass up the St. Lawrence to Montreal, nearly one thousand miles inland, yet about three hundred miles nearer to Liverpool than New York. The ship from Asia, almost irresistibly carried toward Canada by the Japan Current, finds in British Columbia the finest harbors of the Pacific coast with the best and cheapest coal. Thus favored by Nature, the Dominion seems designed to be the commercial highway of the world, and having a most extensive system of internal navigation, great mineral resources, fine forests, prolific fisheries and hundreds of millions of acres of agricultural lands, while the climate throughout its vast extent is everywhere invigorating, the Canadian people must eventually become a great and powerful nation.



## MODERN ICELAND.

BY

PROF. CHAS. SPRAGUE SMITH.

History is the resultant of the interaction of two forces, man and his environment. In the pathless forests, the closely pressed, massive firs, birches and maples with their tufted crests, forming a canopy one hundred feet above us, shut away well-nigh completely all of earth and all of sky. All sense of direction is lost. The level sun cannot force its rays through the interspaces in the wall of trees; the vertical sun, unless poised absolutely above our heads, cannot indicate to us the mid-point in its diurnal arc. We ask of the blue patches of cloudland above and of the dim aisles about us in vain whither we shall turn.

But the experienced woodsman, allowing his eye to follow the ragged trunk of the birch or the firm brown bole of the maple, observes carefully in which direction the souple crests bend.

"Yonder lies our course," he says, "for the trees bend eastward." We know almost a sense of pity, of fellow-feeling, for our brothers the children of the forest, when we also observe that, despite their erect might, the proud crests have been compelled to do obeisance to a superior force. For, unless our life course has been very brief, we also, amidst all the pride of conscious strength and eager insatiate aspiration, have been forced

to bow. From whatsoever source or sources the race dispersion moved, that has given its populations to the two hemispheres, every pebble in the stream-bed, every zephyr that ruffled the surface, every influence from without, whether silent or sonorous in its manifestation, has left its impress. Thus children of one stock, one blood, one heritage, became differentiated into races widely separate in character and customs.

And when the mighty west wind sends forth its phalanxes and, in charge on charge, urges on the assault upon the firm erectness of the forest kings, we sit beneath their shadow, in the safe shelter of their marshalled hosts, and listen to the sounds of the conflict. Bending before the shock of the assault, the tree-tops hold the winds and, as it were, repel them. And the hoarse voices die gradually away into a distant moan or forest murmur. Then anew, far above, we hear the advance of the vanguard, a whirring as of wings in the foliage, growing clearer, louder each instant; until, with a roar, as when the surf breaks upon a rocky coast, the attack is renewed. The multitudinous crisp fluttering of the leaves, intermingled with the hoarse creaking of the boughs, follows, and the force of the onset is again spent.

Even more of charm is offered to the student of history. From the safe eyrie of the present, he can look backward and downward upon the struggles of the past. There man wrestling with nature succumbed. Here in azure girdled, azure roofed Hellas, he led nature captive, reading her laws of beauty and immortalizing them in marble and words.

And, as the student's eye sweeps with affectionate in-

terest the horizon, it turns at last northward. As from an inexhaustible spring of native unsullied energy, there flowed southward, during the first centuries of our era, streams of humanity to revitalize, renew the decadent, exhausted South. So through myriad waterways the fertilizing Nile is led into the parched fields of Egypt.

And amongst all the Germanic tribes, the northernmost perhaps contributed most of stimulus, most of energy, tipped with the fire of enthusiasm, and held to the tense bow-string of determination. Away it whirrs and wherever it falls, its magnificent life is infused into the dormant or decadent societies.

Instinctively we ask, if the Norse energy transplanted could and did communicate such vitality to the masses of life with which it was brought into contact, what did it effect at home?

Norway cannot answer this question, for the wasting of its best life in wars, or the loss occasioned by emigration, combined with other forces, operating from without, stunted and held back the natural development.

Iceland answers it. That answer is distinct among histories, alone among literatures, rugged, masculine, powerful. The Norse life found here its just expression almost entirely free from foreign influence. And, as in the forest, nay, more than in any forest, that struggle between the creature, the life, and its environment is filled for us with human interest.

It was not a fertile promised land, not even a rock-bound New England, that the Norseman discovered and occupied. It was an old battle-ground, where the

giants of frost and fire had been contending ever since it emerged from the sea. Seamed, scarred, blasted, the pores of earth sealed with congealed lava or choked with volcanic sand, that whole island the giant of fire claimed as his domain. Only a narrow interrupted strip of verdure surrounded the waste central plateau. The frost giant, silently, constantly at work, hooded the volcanoes with ice-caps, or ever their fires were extinguished, and, compressing the summer within the narrowest limits, chilled the heart of nature. Her enfeebled vital-force could only yield a close short grass and a low shrubbery of birch, fir, or willow.

In favored localities the kernels deposited in her bosom might be warmed into living-life, and green spires of grain rise through the broken soil.

But such conditions were rarely present, and fruit or timber-yielding tree was unknown. No wealth from soil, none stored up in the veins of the mountains; a region exposed to the inclemencies of a northern winter, tempered by the equatorial stream, it seemed rather adapted by nature to become the Labrador of the Old World. We might have expected that the fisherman would build his hut upon its shores, and perhaps pasture his sheep in its intervalles. But that men in numbers, sufficient to form a state, should voluntarily select this island as their home, with the whole world open to them, seems indeed surprising.

The struggle with the environment was a protracted one. Only Norse energy could have wrested from the surrounding conditions so much of permanent value in manly effort and achievements. Iceland had organized a united democratic state, controlled by a senate of

chieftains, before Hugh Capet became king of France.

While in Mediæval feudal Europe the common man was esteemed little better than the beast of burden, the common freeman in Iceland, save for his exclusion from the ruling assemblies, enjoyed equal recognition with any. As the tales of the first settlers were told at the yule-feasts, or in the booths at the Althing, no one's blood flowed in prouder waves than his. They were his countrymen, his kinsmen, his brothers, equal, not superior, in birth-rights. In all the literature of modern Europe, I find nothing that leads me back to nature, into the immediate presence of her rugged primal forms, so directly and entirely as the Old Norse literature, whose almost exclusive home was Iceland. And, to me at least, it seems a source to which it were well for much of our emasculated thought and expression of the present day to turn. But the picture, rude and vigorous, in outline and coloring, of that age, I shall not attempt to hold up before you in these pages.

Iceland's life, as a free state, ceased in 1262-64 through voluntary submission to Norway. All the forms of her democratic state-organization were replaced by crown-offices. Self-government vanished, and with it died the Norse buoyancy of spirit and dauntless energy. The six centuries following upon the union with Norway are essentially barren of interest. Without unfolding the volume of her records during that long period, we turn therefore to the Iceland of to-day.

And now I shall invite you to embark with me upon the *Laura*, the larger of two Royal Danish mail-steamers plying between Copenhagen, the Farøe Islands and

Iceland. Arriving late in the evening on the "Flying Scotchman," the beautiful city of Edinburgh retains us only for an hour.

The chasteness of its architectural lines, the charm of its clean, broad streets, the quiet coloring of its drab and grey buildings, the lyric poetry of its myriad squares and of the thickly-foliaged slopes, that descend so precipitously into its picturesque ravines, the grand hill-fortress crowning all, a mediæval heroic epic in stone seen for a moment, leave upon the retina an impression of civilized life and of art, that will rise ever and again, in vivid contrast, in presence of the scenes of the northern world. At day-break we are off the eastern coast of Scotland, a line dim and low in the distance, lost wherever a deeper bay indents the shore. The Orkneys enveloped in mists are half-seen, and then the eye turns ever northward, seeking to glide between sky and sea, and grasp at last the dream realized, incorporate, of this northern world. For however so wide one's journeyings, when the keel leaves the beaten ocean track, there is a sense of penetrating an unknown, only half-discovered region.

On the third morning, the mate tells us that land is in sight. In the midst of the North Atlantic rises that picturesque group of rocky islets known as the Faroe Islands. The equatorial stream, pressing northward, with its accompanying warm currents of air, heavily charged with vapors, finds its course suddenly barred by an irregular line of stone fortresses. The heavy air seeks in vain to pass their crests and, in sluggish trailing fog and dissolving cloud, the south winds leave half their burden behind. The Faroese hopefulness finds



notwithstanding expression in the title of one of their two weekly publications—*Dimmaletting*—the lifting of the fog. And nature were chary indeed, if she responded not at all to such persistent good will. So at times, she is said to draw aside the fog-curtain and reward the faith of the islanders with fleeting glimpses of the sun. As we wind out and in among the fjords, we rarely, if ever, escape the impression of being in mid-ocean. The Rhine and Hudson, on their way seaward, at times are pressed closely by vine or forest-clad hills, and the traveller's eye is charmed with the gentle, refined grandeur of the scene.

Broaden the river bed fourfold ; strip the mountains of their verdure ; leave them naught but bare rocks, cut seaward in precipices of several hundred feet, and lift them to a frowning fog-mantled height of from two to three thousand feet.

And, for the poetry of mediæval castle or modern chateau, con over in memory the songs and tales of the Vikings, who, through these winding ocean-rivers, turned homeward from some piratic foray, or swept seaward to win name and booty. You hear again their voices joining in some wild, harsh, strong, alliterated pæan of battle and victory ; you see the broken, cold, grey-blue of the fjord cut into glittering foam by the sharp keels, pressed onward with the sinewy strength of proudly-rhythmed Norse oars. Emerging from the fjord, we are at once in mid-ocean. And, as the rugged, tempest-scarred battlements shroud themselves quickly in the fog and night, it is as though we had awakened from a vivid dream of Viking-times.

Iceland was discovered by a Norse sea rover, Nad-dodd, who,\* while seeking the Faroe Islands, was driven out of his course. Our ship's head is now turned in that direction and, for two days still, we shall have only the larger and stronger-winged sea-fowl of the North Atlantic, to indicate to us that we are treading unaccustomed water ways. Like everything animate and inanimate here, the breath of the storm has passed over them, the ruggedness of primitive nature has been infused into them. Or, is it only our enkindled fancy, for they seem to buffet the air with more of conscious strength, and to extend over the darkened sea a broader expanse of white and grey wings. Late in the afternoon of the third day, low precipitous crags are in sight.

Indeed, for some hours previous, the clouds to the north have defined, without disclosing, save to willing imaginations, the forms of that broad system of glaciers that occupies the south-east of Iceland, the Vatnajökull (glacier of waters). The crags in front are the outlying islets of the Westmanna group. When Ingolf, in the last quarter of the ninth century, set sail for Iceland to effect the first permanent Norse settlement, he had as companion Hjørleif, a sword-brother and husband of his sister. The pious Ingolf offered sacrifices to the gods and, when off the south-east coast, threw the pillars of his high seat into the sea. As the waves received them, the devout Norseman promised Odin or Thor, that he would dwell where the pillars, divinely guided, were cast ashore. But Hjørleif made no sacrifice, threw overboard no pillars for winds and waves to

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\*Latter half of ninth century.

toy with, but self-reliant, took land where it seemed good to him. He, who recognized the overruling hand of the gods, became the father of the Icelandic community, and the desolate shore, upon which his pillars were left by the receding waves, is now occupied by the wharves of Reykjavik.

But Hjörleif fell beneath the murderous hands of his thralls, West-men, Celts, who fled to the islands lying perhaps half a-dozen leagues off the coast, but escaped not the avenging hand of Ingolf. The group bears their name, being called the islands of the West-men. As we draw nearer, we remark that the brown and the iron grey of the rock is curiously seamed and dotted with white. Approaching still nearer, the seams disintegrate, the spots disappear and, in their stead, the whole air in front of the crags is sown with countless, glancing wings. As when cold, light snow flakes, lazily falling through the still interspaces of air, are seized by a passing gust and, in a confused whirl, circle in and out, now massed, now separate.

The steam-whistle shrilly signals our approach. And, at once, from their perches upon the cliffs, from their circlings in mid-air, the gulls, the guillemots, the auks, the puffins and myriad other sea-birds I do not recognize, sweep outward and upward from the ship, forming, as it were, the lower curve of an ellipse of white whirring wings. And, as the impelling fear loses its force and the desire for the nest or for repose strengthens, the ellipse curves backward, an almost unbroken arch. A second blast—the air is filled with a confusion of glancing wings. Then the resonant cliffs become silent as before and, through the air, as fall the snow flakes when

the gust has passed, descend on fluttering wings the birds, each returning again to his perch.

The anchor is weighed and, with the afternoon, the clouds lift, and we see the surf beating and breaking upon the south-west coast of Iceland. As day descends, the clouds and vapors, floating in mid-air, vanish.

To enter the Faxa Bay at night, when summer reigns and the air has the crisp clearness of a morning in the Alps, is to turn a new page in the book of nature. \* Day has only departed for perhaps three hours, and her throne is held by a presence that delights in mellow radiance. The clouds are glowing with the living colors of the first hues of sunset, or the last before sunrise. The sea is smooth as a lake and all about mountains rise, softened in their forms, harmonized in their coloring into perfect accord with the chaste beauty of the whole. Towards delicately flushed mountains, beneath a pellucid sky, over a whispering sea, with an horizon girdle of glowing clouds about us, we approach the goal of our journeying.

Were the whole of Europe to be compared to the human body, I should conceive of France as the throbbing heart, of Germany as the brooding intellect, of England as the active hand. Such a distinction of functions, in the economy of European state life, is, I need not remark, only defensible as a perhaps suggestive figure. In 1789, 1830 and 1848, the quickened pulsation of France, that enkindling of hopes and their partial fruition, was communicated to all Europe. There is always and everywhere, in enthusiasm, a spirit of generosity, whose wide-reaching effects survive long

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\* Longest day in Reykjavik, 20 hours, 54 minutes ; shortest, 3 hours, 58 minutes.

after the source from which they flowed has become chilled into indifference, or even despair. The rebirth, politically, of Iceland can thus be traced back to the movements of 1830 and 1848. With 1830 that political agitation began in Denmark, which fostered and prepared the way for the present partial independence of Iceland. And there came, in the midst of that struggle, a moment rich in dramatic interest, recalling that other pregnant moment in 1789 when Mirabeau, in the name of the French Assembly, declared to the royal representative, who had ordered the delegates to disperse, "We will yield our places only to the bayonets."

In 1851, a national assembly had been convened in Reykjavik to consider and report a plan for the future relations of the island to Denmark.

A proposition, drawn in Denmark, had been presented, but it did not secure the desired autonomy.

Under the leadership of Jón Sigurdsson, the delegates brought in, therefore, a new bill. The royal commissioner, having sought in vain by censure and by the presence of Danish soldiery to overawe the assembly, declared it dissolved. Thereupon Jón Sigurdsson rose and said: "I protest in the name of the king and the people against this proceeding," and the members rising, with almost one voice, responded: "We all protest."

Honor, the highest human honor, to Jón Sigurdsson, whose patient, persistent patriotism, wise counsels and unselfish life accomplished for Iceland what others have effected in larger spheres for other communities. He is their peer in all that constitutes manliness, for, not the opportunity nor the gift, but the use thereof, determines the measure of human worth.

Out of the long struggle came first, in 1854, free trade, or what is essentially equivalent thereto, and in 1874, the millennial anniversary of the settlement of the island by Ingolf, Christian the IX. brought to Iceland her present constitution.

A minister for Icelandic affairs resides in Copenhagen, and forms the medium of communication between the dependent state and the King of Denmark. Administratively, the island is controlled by a governor, two vice-governors (*Amtmenn*), and eighteen provincial magistrates (*Syslumenn*).

Under these again we have officials in charge of the poor-rate districts or "rapes" (the *Hreppstjorar*). The local magistrates from the *amtmenn*, or vice-governors, down, are assisted in the discharge of their functions by advisory boards. So far as I have been able to ascertain, however, all offices in the civil service are conferred by appointment, save those of certain of these counsellors, who are named by popular suffrage.

The *syslumenn* fill, like a certain Chinese dignitary, known to operatic fame, all offices; they are collectors of taxes, bailiffs, auctioneers, judges of first instance, etc. From their decisions an appeal can be made to a superior court of three judges, sitting in Reykjavik, and from this in turn to Copenhagen.

The Althing, or parliament, shares with the king the power of law-giving and has exclusive right of taxation. No law, however, is valid, unless it is sanctioned by the king.

Iceland receives from the Danish treasury a fixed annual allowance of 60,000 crowns, £3,333 $\frac{1}{3}$ , as indemnity for losses sustained in consequence of the royal



confiscations at the time of the Reformation, and of the ruinously oppressive royal monopoly that held in full force until 1786. The island returns nothing in taxes, and is exempted from military obligations.

The Althing sits biennially in two chambers; an upper house of six members, appointed by the king, and six elected by the people, and a lower of twenty-four popular representatives. The Church forms also part of the state organization.

Iceland is divided ecclesiastically into one bishopric, 20 deaneries and 299 parishes, with (in 1888) 141 livings. Bishop and deans are appointed. Priests are chosen in this wise: Three candidates are sent, by the governor, and of these three the parish chooses one, who is thereupon confirmed by the bishop.

Livings, however, which yield an annual income of over 1,800 crowns (\$500), are conferred by the king.

The state Church is Lutheran, but since 1874 religious freedom obtains. In 1880 there were 12 inhabitants who did not accept the Lutheran confession, including 1 Catholic, 1 Methodist, 4 Unitarians, 3 Mormons, and 3 without stated belief.

The state also cares for the bodily welfare of its citizens. There is a "landlaeknir," chief physician, resident in Reykjavik, who is appointed by the king, and some twenty-five physicians, assigned by the governor to different localities. These are subject to the visitatorial inspection of their chief.

The clergy, save the bishop, are dependent upon their prebends, upon tithes and perquisites; the physicians are enrolled in the civil list and also, I understand, are recipients of certain fees.

The governor's salary, including special appropriations for secretary, etc., is \$3,450; the bishop's, \$2,225.

Educationally, the university grade of instruction is represented by two faculties at Reykjavik, medicine and theology, from which the staff of priests and physicians is constantly recruited. Beneath these stands the Latin school, corresponding to the German gymnasium. There is also an institution in the north, at Möðruvellir, near Akreyri, which corresponds to the German Real-Schule.

My host and friend, Dean Thorarinn Bodvarsson, has also founded, in memory of a beloved son, an institution of higher general training for lads at Hafnarfjörth, near Reykjavik. These latter schools attract comparatively few pupils; the Latin school is, however, well attended. There, are besides, four girls' schools, three in the north and one at Reykjavik, in which a certain general instruction in history, geography, arithmetic, etc., and the housewifely occupations is given, but here again to very few pupils.

Elementary instruction in the few towns is cared for in schools; in the country by the parents, the priests or private teachers. For confirmation an ability to read and write is required.

The population of the island, according to the census of 1888, was 69,224; of Reykjavik 3,599; of Isafjörður, the second town in size, 692; of the five largest settlements, excluding Reykjavik, 2,761. In three years the population has decreased by about one-thirtieth. This is due to emigration. The vast majority of the inhabitants are distributed in isolated farms, occupying the narrow belt girding the waste central plateau.

In general it may be said that these farms are hardly

more numerous than villages in the more thickly settled countries of the Old and New Worlds.

We are wont to think of Iceland as an exceedingly remote region, and yet it is only 500 miles distant from Scotland, 600 from Norway. It has a superficial area of 39,200 square miles, being thus about four-fifths as large as the State of New York.

Its greatest length is 300 miles, its greatest breadth 200. Two fifths of the island are said to be habitable, nearly one-fourth entirely waste. The traveller's impressions would enlarge the latter fraction at the expense of the former. While lying only just below the Arctic circle, owing to the equatorial currents and its insular position, the range of variation in the temperature is limited, and the extreme of cold far less than we should imagine from its proximity to Greenland. The mean temperature of the year in Reykjavik is  $38^{\circ}$  Fahrenheit, of the summer  $54^{\circ}$ ; in Grimsey, in the extreme north, the yearly average is  $34\frac{1}{2}^{\circ}$ .

Iceland has no manufactories.

Its population along the sea-board depends upon the fisheries, in the interior valleys mainly upon sheep-raising. Its exports are fish, oil, sheep, salted meat, lamb-skins, ponies, eider-down, feathers, and a certain quantity of mittens woven from the Icelandic wool.

A witty Scotchman whom we knew in Reykjavik, an ancient mariner of kindest heart and hand, never mentioned Iceland without styling it—"the God-forgotten country." According to him, when the Divine Being, having completed his work of creation, declared, "It is good;" Satan, standing beside Him, thought, "I too would like to try my hand."

Being accorded permission, at his command Iceland rose from the sea, and his sombre majesty also declared, "it is good."

The island might almost be described as one vast volcano, once submarine and now with myriad sealed craters, behind whose stone doors crouch fiery floods, that at any instant may burst forth anew.

It is formed of basalt, lava and ashes. The east and west fjords, the oldest parts of the island, are constructed almost entirely of strata of basalt, placed the one above the other. The centre of the island, especially the central plateau, upon which the glacial mountains (the Jöklar) rest, consists in great part of tufa, a composite formation of hardened volcanic ashes and sand, resulting apparently from eruptions and accumulations at the bottom of the sea. From this highland rise those sharp peaks of lava and of white or red trachyte, that, at a more recent period, broke through the tufa-crust.

In the cooling of the basalt deposits, frequently great clefts were formed and, through these, the volcanic fire could easily rise to the surface. The diversity in geological character between the different parts of the island has determined its varying physical aspects. Where the basalt predominates, the water has, as it were, been forced to hew its way over or through iron barriers, and precipitous crags and irregular fragments of rock mark the course of the streams and the lines of the bays. Where the softer tufa occurs, broad valleys, gentle slopes and rounded elevations result.

The island rose gradually from the sea, and, in the Miocene period, had a climate and vegetation re-

sembling those of Central America (Florida and Mexico), to-day.

The glacial age came to Iceland as to all northern lands, and, as the ice melted, the island began to assume its present appearance.

The lava beds that cover such vast areas, in part antedate the ice-age, but are in the main of more recent origin. The earlier lava streams were, of course, in many cases smoothed and filled up by glacial action. The formation of peat-bogs from the vegetation, and of soil from the clay deposited by the glaciers had the same history here as elsewhere. Since the settlement of the island in *circa* 870, there has been very little change in the physical conditions. Glaciers, *i. e.*, glacial mountains, occupy nearly one-seventh of the entire superficies. The Vatnajökull alone covers an area of about 3,200 square miles.

Volcanic eruptions are known to have occurred during the last 1,000 years in some 20 different places, but many outbreaks passed unobserved, since their fury was expended upon the desolate central regions. We have evidence of 18 eruptions of Hekla since 1104.

In 1783, from the Skapta-jökull two streams of lava issued, the one 50 miles in length, from 10 to 12 miles in breadth and 100 feet in depth, the other 40 miles in length and 7 in breadth. An area of 420 square miles was covered. One-sixth of the inhabitants and one-half of the live stock are said to have perished, as direct or indirect consequence of this outbreak ; though this official estimate is declared by some to be an exaggeration. \*

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\* Poestion (Island, page 119) gives as dimensions of streams : First stream, length 10-11 Danish miles, greatest breadth 3 miles ; second stream, length 9 miles,

Iceland has essentially no mineral wealth—iron, copper in small quantities, Icelandic spar, aluminum and coal exist in one or more localities, but apparently not in sufficient quantities, save the spar, to repay working. Lignite also occurs, and sulphur in extensive deposits. The latter may at some time attract and repay foreign energy and capital.

Away now from statistics to the presence and friendly hand-clasping of the people, and to communing with that bleak northern nature.

No forest will limit our vision, as it is sent forth upon every radial line to the encircling horizon. For Iceland never produced anything save low stunted trees, even in the ninth century, if we can trust the record of the trunks, that the soil has mummified; and to-day the Icelandic “*skóg*” (forest), translated into terms of an English landscape, means this: Low birch, willow, or juniper bushes, in rare localities, form thin groves with an average height of perhaps 8 to 12 feet;\* elsewhere they crouch earthward like poor hunchbacks, or, if timidly and feebly venturing skyward, allow often the wild geranium to rest the fresher green of its leaves and stalk against their seared stems and fluttering foliage, while its purple cup, lifted high above their crests, quaffs unhindered the wine of air and sunlight, and nods a bold and blithe welcome to bird and insect.

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breadth 2 miles. Depth of lava, in places 500–600 feet; in the plains, however, not above 20 feet. A Danish mile equals 4.6812 English miles. The official reports give losses as follows: 9336 men, 28,000 horses, 11,461 cattle, 190,488 sheep.

\* Kaalund. “*Bidrag til en historisk-topografisk Beskrivelse af Island*,” Vol. II., p. 143, speaks of a grove where trees reach a height of from 16½ to 18½ feet. Personally I never saw, outside of Akreyri, a bush above 7 feet in height, but I did not visit the few most important forests of Iceland.—(C. S. S.)



One meets everywhere with open-hearted, free-handed hospitality, honest, intelligent, but heavy, careworn and rather downcast faces. None of the Anglo-Saxon push, or the French *esprit*, fire eye and steps; but there is a patient plodding expression and carriage; the horizon, material and spiritual, is a very narrow one. The son cannot rise in fortunes much above the level of the father.

He might do so, or a later generation might, if he would emigrate; but love of country is strong.

The degenerate Greek is said to loiter all day about the cafés, an idler and good-for-naught, swollen with pride in an ancestry to whom the world will always owe an incalculable debt, for its eager endeavor, that reverent search for and loving recognition of the true and beautiful.

But they are not his ancestors, they are ours. The worker and producer enters by divine right into the exclusive heritage of all the working past. The Icelfander, proud of that heroic past of Saga times, that bloody, cruel past, whose memories he cons over in the hours of enforced or induced idleness, is loth to follow where Leif and others his landsmen, nine centuries ago, marked out the way. His language is pure from foreign admixture, from weakening contractions and loss of grammatical flexions, pure as no idiom of cultivated central Europe. He will hold to the ancestral heritage, in soil, speech and customs, and the world without can "gang its ain gait." Well, if he has degenerated, as we at least are convinced that he has, in energy, in enthusiasm, in that adventurous spirit, which always is pushing back the visible horizon,

and at times with such energy that, as with a Leif and a Columbus, the diaphanous veil is dissipated and a new world revealed; if the internal qualities and the external material conditions have deteriorated in many respects, the old Norse welcome is just as hearty as ever, and the home, be it a turf-walled, peat-reeking hut, or a roomy, comfortable frame house, has its door standing always wide open to the stranger.

The towns are fishing hamlets, with a certain added gentility and scholarly culture, diffused from and within the educated circles.

But the typical Icelandic life of to-day is not to be found here. We must wander away to the home of some farmer, be he rector or husbandman (*bóndi*), and, in his simple study at nightfall, or, leaning upon the turf-wall surrounding his domicile, at the hour when the sheep are returning from the mountain pastures to right and left of the valley, win our way into his confidence. He will not have much to tell us. Little that would appeal to us beckons from his present or his future, but honest faithfulness, in the midst of a very narrow circle of duties and possibilities, is his approved claim to our hearty respect.

At times we shall meet men whom contact with the outer world has transformed.

They will display, perhaps, the urbanity of a cultured scholar or the ready wit of a French "*causeur*," but these travelled tillers of the soil are few and rare.

To watch at daybreak his servant, or son, or daughter leading the sheep away to the hills; to perform the rude services demanded by his simple stock-farm; to shoe his horses and repair his tools in his own smithy,

and, when the meadow grass is a few inches in length, to go forth with his farm-hands and swing in quick, straight lines, not in long, slow, rhythmic curves, his straight, short-bladed scythe; to load the hay upon his ponies, or watch by the barn entrance while they return with their evenly-balanced hundred-weights, and estimate thereby the year's fruitfulness; to carry the products of his dairy and farm, butter, cheese, hay, cured meat, etc., to the towns and there exchange them for coffee, sugar, grain or boards, or, perchance, some womanly vanities for the good housewife; to join with his neighbors in the folk-sports of wrestling, etc., what time the sheep are collected from the high mountain pastures; to read aloud in the winter-days from the old sagas or from some book of devotions the while the women spin—such is the round of his duties and vocations.

When a wayfarer on horseback approaches, he will go forth to meet and welcome him and, a half hour later, over a cup of chocolate or coffee, with a little glass of liqueur, they will exchange their budgets of gossip. But, while we have been lingering with the farmer, interchanging news from the wide outer world for facts and fancies woven from the life of this narrower circle, the good-wife has been bending over the glowing bed of peat-cinders, preparing our breakfast.

It is early August and the succulent ribs of the mountain-pastured lamb would tempt even an epicure, despite the rudeness of cloth and table-furnishings. Fastidious appetites, however, would go a-fasting here, unless stimulated into common sense activity by the invigorating qualities of this northern air and scenery.

For, not merely the inferior quality of the viands, save the lamb and milk, and the absence of variety characterize, of necessity, the farmer's table ; but also, far too frequently, there is an entire lack of domestic and personal neatness.

The transparent purity of the atmosphere and the sparkling clearness of the brooks and rivulets, that pass their very doors, should suggest to this island people the thought of suffering the air indoors to become as free from pollution, as that without, and holding their life, on its physical side, as clear from soil as the water of their mountain springs. But to-day the indifference of these Icelandic farmers, as a class, to neatness offends every sense as well as every hygienic law. The good farm, whose turf-roof covers us, forms, however, we assume, an honorable exception to the rule. Though our host may only have two tumblers in his china-closet and our party must therefore imitate elder days and pass the horn, a prosaic horn, from hand to hand, as we quaff the abundant milk, every thing indoors is as neat and wholesome as conditions permit. After breakfast, having taken a last look about the low guest room, where chests supply largely the place of chairs, and a rude table and bed and small hanging book-shelf, with its rows of well worn, brown-backed volumes of sagas and books of devotion, complete the inventory ; we pass through the dark narrow passage-way and, stooping at the low entrance, find ourselves again in the open air.

Our ponies are all in readiness, we mount, call out as farewell to host and hostess, "be ye blessed," and ride away.

The farm-stead, with its line of low structures, turf-

walled and roofed, with white wood gables facing the outer world, will long remain in sight, commanding the valley from its little knoll. The "tún," or home-field, is enclosed between broad, low walls of turf and a bridle-path, similarly walled, conducts us across it and out into "no-man's land." For certainly I cannot conceive of any one desiring to lay claim to the desolate, hopelessly desolate, infinite expanses of barrenness, that press so closely upon the oases of the farms.

Away then out into this world of Iceland.

We have steeds beneath us that are as swift as thought and as wayward as fancy. They are thought and fancy turning backward to linger, or hasten, amidst scenes that once impressed the willing senses. Come then and wander with me upon such coursers hither and thither about Iceland.

We are traversing the south-western peninsula, at a leisurely pace. At nine o'clock A. M. we had our first meal and, with a few cheese sandwiches in the saddlebags of the good Dean, our guide and host, we expect to endure until the twelve-hour sand-glass is turned.

Our party consists of three, the Dean, an Icelandic lad and an American. We have clattered over, or painfully clambered over, lava streams *ad infinitum*, struggled through broad, deep stretches of sand and driven our ponies at a mad pace over every kind of track, save a smooth hard meadow.

We have forded rivers and scaled mountains, and learned meantime a few strophes from an Icelandic song, descriptive of the Fatherland.

We are now in a particularly desolate region, a valley of sand, high up among the hills, surrounded on all

sides by conical elevations of sand, ashes and other volcanic deposits.

The two younger members of the party are tempted to test their ponies' mettle and, dashing with wild halloo down the steep slopes, reply somewhat tauntingly to the Dean, who urges greater forbearance. "Well, I'll set the pace," he retorts, and away he flies on his squarely-built grey charger, leaving our panting ponies far in the rear. Up the hill-side we clamber over lava-fragments of every color, grey, yellow, purple, iridescent, from opaque almost to transparent, and with pink and white flowerets strewn here and there.

But, long before the hill-crest is gained, we are sedately moving, in slow and single file, the Dean leading. A moment later, and the eastward side of the rib of mountains, that we are crossing, slopes away from us down into the valley, many hundreds of feet below.

The sea stretches cold and blue far away to the southward. And beneath us winds in and out a valley, narrow or broadening as the boundary hills permit, dividing northward into separate arms, and lost to sight, where it curves behind a distant projecting spur.

It is a wide valley, resembling in its contours many a grass-carpeted vale, where we have seen farms and rectories clinging to the base of the hills, or perched on little knolls, mid-plain, whence to overlook their domain of meadow and pasture-land, and lure homeward at nightfall the shepherd and sheep.

But a river has filled it all, a deep, strong, angry river of molten lava and, over yon slope, it has poured into the sea. The bordering hills are all seared and blasted, as if from the breath of a furnace, and the



conical mountains, pressing each other all about, are extinct volcanoes. It does not require a very vivid imagination to remove the seal of death from this stream. For the waves, even as they broke high in air, were transformed into sharply serrated ridges of stone, and the eager surf, chafing against the border walls, became heavy and congealed, ere it could shrink back into the river-bed. What an inferno of flame and noisome exhalations must have risen from this immense moving caldron, to blast and blacken the light of day!

Yet it is but one of a number of these lava valleys that our ponies must cross to-day. Thorvaldr Thoroddson counted in this peninsula alone 300 volcanoes, with some 800 distinct craters.

And summer is so brief here that, even in a thousand years, nature has not been able to repair the ravages of that remote chaotic upheaval. Flinty and almost as barren as at the first of even a blade of vegetation, many of these rigid rivers remain even to-day; over others time has spread a grey veil of lichens, and others still have perhaps disintegrated slightly, or, more probably, have jealously guarded the few grains of soil, lifted mid-air by the winds and thence descending, as a scant fertilizing shower, upon their barren crags. Ere long, the same forethoughtful winds, loving to beautify nature's waste places, let fall seeds; or strong-winged birds forgot, in the joy of wild responsive cries, the grains they were bearing to their rocky eyries.

These seeds fall not all on stony places. And so, when June reaches Iceland, were it not that the physical vision is dulled and blinded to the most beautiful and wonderful things that are taking place about us, a

breath of spring might be seen, just touching the lava crests, and, in white and yellow flowerets, leaving turned a page of nature's book. As we pass, we read, and hope shoots forth anew her timid spires in the waste places, if such there be, of our present and future.

Pass, oh picture, left upon the memory by the volcanic world of the south-west, and give place to the impressions traced by the scenes and experiences of the central desert.

The party is in number the same, but the good Dean is in his quiet rectory at Garthar, that looks down over an enclosed rectangle of grave-mounds at the blue bay of Hafnarfjörth, and beyond at the sombre line of volcanic peaks, rising forth from the midst of that desolation of the south-west. The two companions of the American are young Icelandic pedagogues, on their way to their northern homes.

Since leaving Reykjavik we have seen little but waste land.

Heath (*heithi*) in Iceland means a region of sand-hills where at times a coarse grass or wild grain strives to grow, but with scant encouragement, and we have been on heath moorland or lava now for more than two days.

Here and there, in the river bottoms, or in the sheltered nooks hollowed out by some kindly providence in the leeward slopes of the hills, we have found pasturage for our ponies. We have visited the Thingfields, site of the old Icelandic Parliament, the levelled bed of an ancient lava stream of immense breadth.

A section thereof four miles in width has become depressed, probably through some later seismic action,

and the high lateral walls have cloven apart, forming on both sides very impressive ravines, several miles in length.

The most famous and magnificent of the two is known as the *Almannagjá*, or public rift. Its higher or western wall has an average height of from 80 to 100\* feet, and the lateral fractures are so even and regular that the various sections of the wall seem to have been laid in their places by the hands of some northern Anaks.

The old lava-stream, now thinly draped with a coarse herbage, and a ragged, dwarfed forest, has nothing in common with the lava rivers of the south; there is no fierce commotion here; no suggestion of a confined, chafing flood, in the moment of its uttermost wrath, instantly frozen by the fiat of omnipotence; but a broad, low, tranquil upheaval, resembling the calm, vast breathing of the ocean, when in repose.

Leaving the historic Thingfields behind, we traversed *Kaldi-dalr*, the cold valley, where glacier-hooded volcanoes closely confine the path, a narrow desolate pass, that forms, as it were, an entrance-aisle to the high central desert. And now we are on the borders of this desert, where nothing grows, the broad volcanic plateau, that, in an irregular ellipse, occupies the whole centre of Iceland. Huge blocks and fragments of lava are strewn all about us, at first suggesting ruins of some prehistoric, cyclopean structures. To these succeed smaller fragments, about the size and form of paving-stones, and then only a coarse, heavy sand. As far as

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\* Preyer and Zirkel (*Reise nach Island*) give height as in places far more than 100 feet, in others from 30 to 40.

the eye can send forth its messengers, only vast undulations of sand. Not far away, out of the sand-plateau, rises a ridge, dun, smoke-colored, with patches of begrimed snow or ice, lurking in its hollowed crests or lateral ravines. We do not wonder at the folk credulousness that has peopled this uncanny region with a race of mysterious outlaws. A desert were drear enough, but a desert out of which rise volcanoes, or ridges of volcanic ejections, and that combines with the sombre hues and influence of a chilled furnace the icy gloom of an arctic region, is repellent enough to every life throb, to awaken a sentiment of almost shrinking fear. As night comes on, the desert still stretches before us limitless, and the fog shrouds in ghostly robes the dead hills and mountains. At nine o'clock the moon rises, and casts a weird, chilling light over the landscape.

The dun volumes of fog press close upon her, seeking to dull her beams in sombre whirls of smoke, and, bolder grown, dare once and again to thrust a fog-shield between her face and the earth. The moon's struggle is a futile one, the fog-hosts are too densely marshalled.

Yet another and another fog-shield is thrust before the moon, and the circle of her influence is constantly lessened. At last we see her no more, and now, in troops, the fog goes hurrying past and descends ever lower, closer upon the earth. We are their lawful prey, for night has overtaken us upon the desert. We feel their chill, moist touch upon our cheeks, and cannot see our free horses running on before. But merrily we sing, and swinging the Icelandic whip, with loud halloos, urge our ponies ever onward. Indian fashion, we hang almost over their sides, seeking to gather up, as it were,

the scant atoms of light and discover with their aid traces of a hoof-mark.

And so, although we must pass the night, bivouacked within the fog realm, since we at last lose our way, we gain, nevertheless, a pasturage for our famished ponies, and by the next noon, can look back from the safe shelter of a farm house north of the plateau upon the region we have escaped.

The highlands are all shrouded in cloud and over their slopes hang and drift fringes of fog, as though the spirits of the mountains were still watching us, loth to admit their final defeat.

Were an hour infinitely expansible we might continue, yet for a long time, our Icelandic rambles.

But, if we arrest the pendulum, the sun unresting will mock at our impotent efforts in self-deception. Quickly then, that, at least in glimpses, a few scenes may still pass before us. Place yourself at your good pleasure almost anywhere in western Iceland, and, if the summer day be fine, the air will be as invigorating as in our crisp autumn days—the sky as clear as that of the high Alps. Hills near or far, never very remote, will bound the horizon, and, very probably, the truncated, conical forms of one or more will suggest their volcanic nature. Fragments of old lava, pierced with holes as if worm-eaten, will lie within sight, if not within hand-reach.

Perhaps a grassy meadow will stretch away from you and, at its farther end, a white or weather-blackened farm-stead or church rise.

An eagle or hawk may be floating mid-air, while, from projecting boulders, the curlew and ptarmigan are watching your movements, or sidling across your path,



to lure you away from their haunts. At times, in more isolated ponds, you can witness a gracious, domestic scene from nature; the stately swans protecting their beloved cygnet, as they glide swiftly away, father and mother with the child between.

If you would listen to the roar of thronging waters, many a river of Iceland, emerging from the melting snow-banks and glaciers of the highlands, must move in rapid course and in bold plunge before it can gain the placid level of the sea-plains. And where the volumed, sonorous waters descend in massive, blue, translucent curves, or white, foaming, rainbow-tinted, broken columns, far from human abode, with no sight or sound of tree or bird to call your thoughts away, you can converse with the presence that speaks to you from the waterfall. And, from the spray-bathed, crumbling cliffs, or amidst the green spires, carpeting the ledge that overlooks the caldron, you can gather one and another of the fairest, most delicately-petalled and hued of northern flowers.

If you would visit Hekla, wait at its base until every cloud has slunk away below the horizon and the wind is stilled, or clouds and sand storms will obscure the view, and all you will have for your pains will be the impressions and weariness of an arduous climb and a dim, fleeting picture of craters, filled with snow and walled with grey, yellow and purple-tinted accumulations of ashes, sand and slag.

The geysers are but one group, the principal one, of the manifold hot springs that escape the earth in all parts of Iceland.

Their force is becoming, however, gradually spent; an eruption of the Great Geyser does not occur oftener now



than once in ten days, and only a persistent traveller would remain tented upon that barren spot longer than forty-eight hours. Hence that display is rarely witnessed by visitors.

We have returned to Reykjavik, and are steaming away with the *Laura*.

As we bid good-bye to Iceland, a low, trembling arch of light spans the night-sky.

The Aurora-Borealis will soon span this northern firmament with many an arch of greater brilliancy, and there will be war in heaven and hosts of invisible warriors, with glittering lances, move to and fro, and the west be suffused with blood or all ablaze, as when Surtr, the god of fire, shall cross the divine bridge to destroy Valhalla and the elder gods in Ragnarök, but we shall be far away, beneath duller skies, but within more congenial, more generous surroundings.

Before the prow turns finally southward, we skirt the coast and touch at one of the eastern ports, Seyðisfjörthr. The character of the water ways and of their guardian mountains has changed; not broad-mouthed fjords as in the west and north, but long, narrow, winding channels indent the coast, recalling in a measure those of the Faroe Islands.

The mountains too, rise more precipitously from the sea and in magnificent strata, poised one upon the other like a series of tables, or a giant-stair.

There are no indications here of recent volcanic action; the mountains are compact and iron-hued, not loose heaps of volcanic products, such as we have often seen in the west and centre. As we weigh anchor and the shores recede, some Icelandic students, on their way to

Copenhagen, shout their affectionate and proud farewell in the national anthem :

Oh, Iceland, fire's twin-birth,  
Belovéd foster earth,  
Fair mountain queen ;  
Thy sons shall cherish thee,  
While land is girt by sea ;  
Man to maid bendeth knee,  
Sun giveth sheen !

Over the swaying stretches of the North Atlantic, colder, more cheerless, more storm-roused than a three-month since, away to the Faroe Islands again. And one evening, while our boat, sheltered behind the curving shore of a bold headland, waits for the fog to lift, the Faroese peasants on deck join hands and, in a circle, begin their national dance. In slow measure of step and voice, the dance and chant proceed.

It is only a slower, heavier merry-go-round, such as we remember from our boyhood. The words are unintelligible, all save the refrain accompanying each verse, and the Icelanders on board are in equal 'ignorance. But a Faroese interprets ; 'tis some old folk-tale, transmitted in oral strophes from a remote past. As the song proceeds, the motion becomes more energetic, more varied ; the women remain, however, only solemnly stepping participants.

And, with the fog veiling all of the Faroese mountains, save their base, trailing along the bay and diffusing through the atmosphere as intangible rain, the weird chant draws to its end and, for the last time, we hear that "Guthmundr raedr hvar vith drekkum naesta Jól : " Gudmund decides where we shall drink our next Yule-horn.

## SOME NOTES ON THE UPPER AMAZON.

BY

COURTENAY DE KALB.

The following extracts from my notes, collected during a journey which I made up the river Amazon in the winter of 1889-90, having special reference to the geography of the region, are submitted with the hope that they may prove of value by adding some new facts, and also by serving to correct a few cartographical errors which came within my observation.

1. TOWNS.—A. Towns which no longer exist, but are still represented on maps.

CHIRRHUI ; abandoned in 1876.

SAN IGNACIO ; obliterated many years ago.

BORJA ; destroyed by the Indians about 1825 ; partially rebuilt by some Christianized Indians a few years later ; finally abandoned in 1854 or 1855. There is not even a trace of a house remaining, and the forest has completely overgrown the site of the ancient pueblo.

SANTIAGO ; This town, which was on the west side of the eastern cordillera of the Andes, was destroyed at the same time as Borja, and has never been rebuilt.

These two latter towns, together with Limon and others, formed a series of military posts to keep open communication with the towns in the valley stretching northward from the Amazon between the eastern and western cordilleras, *i. e.*, the valley of the Santiago,

where the Spaniards are said to have maintained extensive gold washings.

B. Towns recently built, and not shown on the maps.

ISLANDIA ; on the Peruvian bank of the Rio Javary, four miles from the Amazon.

POMBAL ; on the Peruvian side of the same river, two miles farther up.

CONCEIÇÃO ; on the Brazilian side of the Javary, thirty miles above Pombal.

NAZARETO MORÃO ; on Brazilian territory, at the junction of the Rio Javary and the Rio Itacoahy (wrongly named Tecuachy by Stieler), ten miles above Conceição.

SANTA CRUZ ; four miles farther up, on the Peruvian side of the river.

TRINIDADE ; on the Brazilian bank of the Javary, fifteen miles farther on.

NATIVIDADE ; also on the Brazilian side, three miles beyond Trinidad. These towns on the Rio Javary have grown with great rapidity, owing to the abundance of rubber in the forests of this locality. The population along the Javary and its important tributary, the Itacoahy, has become so large that the regular monthly steamers from Pará to Iquitos always turn aside to land and receive cargo from the ports above mentioned.

SAN ENRIQUE ; on the east bank of the Rio Huallaga, about sixty miles from its mouth.

SAN ISIDRO ; on the north bank of the Amazon, about a half mile east of the Island del Baradero. San Isidro was named in honor of the patron saint of Peruvian agriculture, and must not be confounded with San Isidoro.

PIEDRA LISA; on the north side of the Amazon, about one mile west of the embouchure of the Rio Pastassa.

SHAPÁJA; about four miles west of San Antonio, on the south bank of the Amazon. It is named after a palm, bearing a large edible nut, which grows very abundantly on the "Alto Marañon," as that part of the Amazon west of the junction with the Rio Huallaga is locally termed.

CARAVANCHÉL; on the north side of the Amazon, about five miles west of Shapája.

PARINÁRI; formerly did exist, as the maps show, on the south side of the Amazon, but was destroyed by fire several years ago, and has been rebuilt, a mile or more to the westward on the opposite, or north, shore.



## 2. RIVERS AND ISLANDS.

ISLA DEL BARADERO; this large island is usually represented as dividing the current of the Amazon just below the mouth of the Rio Pastassa, and as having the main channel on the north side. This is wrong. The

entire tide of the Amazon flows in an enormous bend on the south side of the island, while the channel on the north side is one of those canals, or "canoe paths," so common in the Valley of the Amazon, this one beginning in the Rio Pastassa a mile from its mouth, and leading by a very circuitous route of ten miles in length into the Amazon, just above San Isidro. The name of Baradero is obsolescent, being entirely unknown to all but a few of the oldest inhabitants. The current name for the island is LLUICHÚ, which signifies "a deer."

RIO AICHI-YACU; usually shown as a large stream flowing into the Amazon from the south, a few miles west of Barranca. This river should be called the Rio Potro, to which the Aichi-Yacu is tributary, being in fact the west branch of the Potro.

RIO APAGA; instead of uniting with the Amazon at the elbow of the great southward bend west of the Rio Morona, empties into it immediately to the eastward of the bend, as shown in the accompanying cut.

RIO CANGAZO; this river has never, to my knowledge, been noticed by any geographers. Within a few miles of the Andes the Amazon swings off toward the north, and then returns in a south-westerly course to the cataract, or PONGO DE MANSERICHE. Near the northern limit of this bend begins a wide canal, or "canoe path," which extends in a north-easterly direction to the Rio Morona. Along the north-west side of the triangular island thus formed extends a remarkably level ridge entirely disconnected from the Andean system. This ridge is called the SIERRA DE HERAGA. The Indians who annually cross over from the valley of the Santiago utilize it as a convenient overland route to the excellent



fishing grounds along the middle reaches of the Rio Morona, and hence there is a well-defined path along its summit.



RIOS PINCHES AND CHIPANGA ; these rivers, the former represented as flowing eastwardly into the Rio Pastassa, and the latter westwardly into the Rio Morona, are entirely unknown to all classes in this region, but the Indians say that at the place where I supposed the Rios Pinches and Chipanga should be found, is a "quebrada," or canoe path, called CHUINDRE, connecting the Pastassa and Morona. In the course of Quebrada Chuindre is said to be a large lake, rather nearer the Pastassa than the Morona, called LAGO RIMACHI.

I was also unable to find any one who had ever heard of the Rio Apianga, represented on the maps as an affluent of the Morona, and the best informed Indians persisted in affirming that it did not exist.

## GEOGRAPHICAL NOTES.

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THE NEXT INTERNATIONAL GEOGRAPHICAL CONGRESS.—By unanimous resolution of the delegates to the International Geographical Congress of 1889, the Paris Geographical Society was requested to choose the time and place for the next meeting.

Societies throughout the world were invited to send in propositions.

The Berne Society was among the first to respond, with an offer to take upon itself the charge of the International Congress for the year 1891. This offer has been accepted, and the Congress will therefore assemble at Berne in the first days of next August.

The wisdom of the choice is not to be doubted, though it may be regretted, in view of historical associations, that the preference was not given to Genoa, and the year 1892.

THE LIBRATION OF THE EARTH.—A note by Dr. Supan, in *Petermanns Mittheilungen*, Bd. 36, v., calls attention to the fluctuations of the earth's axis. Variations in the latitude of places had frequently been noticed, but it was supposed, naturally enough, that these might be due to defective instruments, or to errors of observation, and it was only at the end of the year 1889 that systematic measurements, made at Berlin, Potsdam, Prague and Strassburg referred the variations to their true cause. Prof. Hel-

mert says, in No. 2963 of the *Astronomische Nachrichten*, that the latitudes of Berlin and Potsdam, which had shown no clearly appreciable change in the first six months, varied during the third quarter of the year, increasing at first, and afterwards diminishing, as much as from 5" to 6". The movement continued through the next quarter and reached its end in January, 1890. There is no room for doubt as to the results of the observations at Berlin, Potsdam and Prague, the discrepancy being less than the tenth part of a second.

This question will be brought before the Commission for International Geodesy, which is to meet at Freiburg, Baden, in September of the present year.

THE EXPLORER'S DIFFICULTIES.—M. Antoine d'Abbadie, in laying before the Paris Geographical Society recently his work on the geography of Ethiopia (see *Compte Rendu* 1890, No. 11, p. 377), mentioned some of the obstacles in the way of the traveller, who wishes to bear true testimony.

Part of his mapping of Ethiopia was made by rapid triangulation. In default of this method, the explorer, noting his rate of travel and the time occupied, tries to get his bearings by the compass, measuring its declination at each place (a thing seldom done), or accepting a supposed uniform declination for a whole region. Too often he finds himself obliged to bring the record of his march into agreement with his occasional observations of latitude or, more rarely, with those of longitude; a matter which ought to receive more attention, since it is dangerous to rely upon the chronometer.

It should never be forgotten that, while the indica-

tions of the compass have a certain value, all the precautions of the observer will not protect it from local attraction.

The continual delays and the forced stops due to the failure of health, to wars between tribes, and even to local prejudices, are the stumbling-block of the traveller.

At such times he tries to inform himself concerning the regions he may not hope to visit, and he gathers orally information that is either imperfect or, too often, contradictory.

“ This,” says M. d’Abbadie, “ is the subject of my book. Those who look through it will see that a little method may be introduced even into this geography by hearsay. For example, the distance from Gondar to Inarya was given to me by a native, intelligent enough to estimate each of the stages by comparing them with distances, which we had both passed over. Men who describe in this way are uncommon ; the great majority take for a unit of distance the day’s march, which is a vague designation, even when it is defined as with, or without, pack-animals, and difficult to compute exactly in taking the mean of large areas, for the alternations of higher and lower ground hardly permit us to deduce from them the horizontal distances, so dear to the compilers of maps. Points of the compass are got at by asking what country lies towards the rising, or the setting, sun. A Mussulman, obliged to know towards what part of the horizon he must bend when he prays, will generally tell the name of the nearest region ; but not always, for the Islamism of the Ethiopian is often weak enough, and I have passed whole months with Moham-medans without having once seen them pray.”

It might be supposed that the direction of a river would be learned by the answer to the question : " When you crossed this stream, did it flow to the right, or to the left ? " On the contrary, most Ethiopians replied that the water flowed toward the low ground.

The character of the information varied with the class to which the native belonged ; the chiefs, who are the most intelligent, giving the clearest answers, though it was difficult to question them without exciting their suspicion, and it was dangerous to *write down the country*, as it was called, even in the presence of the ordinary native travellers. It was necessary to keep in mind whatever was said that seemed to be important, and to wait for an opportunity to put it down upon paper. Not much was to be got from traders, for they were afraid of showing the way to their competitors, and the best information seems to be that given by the young slaves, or by the messengers of the petty kings ; but it is not well to reward the one that gives it, for the money tempts him to invent his news in order to increase his gains. The most trustworthy stories are those that come spontaneously ; and M. d'Abbadie's practice was to begin the conversation on subjects that interested the Ethiopian, and to bring in his geographical questions by the way.

MERCATOR'S GLOBES AND MAPS.—Dr. Van Raemdonck,\* of St. Nicolas (Waas), in Belgium, has done much within the last twenty years, to renew the inter-

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\* The labors of this scholar form the basis of a paper on GERARD MERCATOR : HIS LIFE AND WORKS, by Mr. Elial F. Hall, in the JOURNAL of this Society, Vol. X., pp. 163-196.

est in Mercator and his work, and to dissipate, for a time, the darkness, which inevitably settles, at last, upon every distinguished name.\*

With full acknowledgment of his indebtedness to Dr. Van Raemdonck Professor Fiorini, of the University of Bologna, has just brought out a pamphlet, *Gerardo Mercatore e le sue Carte Geografiche*, originally published in the *Bollettino* of the Italian Geographical Society, for January–April, 1890.

Professor Fiorini has made a critical study of the Flemish geographer, as well as of the literature devoted to him, and appreciates his merit in these words :

“ He was thoroughly versed in historical geography, as appears in the Atlas and in the great Map of 1569. Some of the inscriptions in the latter are true monographs of historical geography, such as the third and last part of the legend in which he explains what parts of the world were known to the ancients, in order that, as he says, the honor justly due may be rendered to the past ages ; and also the inscriptions, *On Prester John, of Asia, and the first origin of the Tartars, That the Niger flows into the Nile, and On the Real Position of the Ganges and the Golden Chersonese.*

“ He had a clear conception of political geography, and he neglects neither the natural history nor the ethnography of the various regions ; and he paid close attention to physical geography ; but it is in mathematical geography, above all, that he commands the

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\* An eminent American geographer had, but a few years ago, this experience: He mentioned, in conversation with a foreign admiral, something that had been done by Mercator. “ Done by Mercator ? ” said the admiral. “ Do you mean to say there was a man called Mercator ? I have always thought that was only a name for the projection.”



greatest admiration, a science that his labors advanced from a state of infancy to one of maturity."

The globes manufactured by Mercator are, naturally, very much more rare than copies of his maps. The gores of two globes (of 1541 and 1551) were reproduced in fac-simile in 1875 from the originals in the Royal Library of Brussels; and Professor Fiorini gives in an Appendix, on p. 81, a list of the existing Mercator globes, all in pairs (terrestrial and celestial): One pair in the Grand ducal Library at Weimar; one in the Imperial Library at Vienna; one in the Astronomical Museum of the Paris Observatory; One in the Library of the Cercle Archéologique at St. Nicolas (Waas); one in the Library of Nuremberg; and one at Cremona; in the Library.

To these Professor Fiorini adds, in an article published in the *Bollettino* of the Italian Geographical Society, for June, yet another pair, recently discovered in the Library of Urbania (formerly Castel Durante) in the Marches; and one, also, in Austria.

A pamphlet of 40 pages, *I Due Rarissimi Globi di Mercatore*, published by Mr. G. Buonanno, librarian of the Cremona Library, describes the globes mentioned by Professor Fiorini.

They correspond, point by point, with one or two exceptions, with the details given by Dr. Van Raemdonck in his account of Mercator's globes.

The supports and the horizons of the Cremona globes are the work of a later time, but the horizons are meant to imitate the originals.

The globes are about 4 feet 3 inches in circumference; the number of gores is twelve, and the in-

scriptions are in Latin and Flemish. The terrestrial globe bears the date of 1541\*; the celestial that of 1551.

Mr. Buonanno, who has held his position in the Cremona Library for only four years, has been unable to find in the records any mention of the globes but these few words in an inventory, made in 1872: "Two wooden globes for the study of Geography." He found, however, on the lower surface of each globe, Roman numerals similar in shape to those inscribed on some of the shelves, which were formerly in the Jesuit College at Cremona, founded in the beginning of the 17th century. He discovered that Cesare Speciano, Bishop of Cremona, and a man eminent for learning and culture, was sent to Germany as Nuncio in the year 1592; and there is nothing unreasonable in the conclusion that the Bishop acquired the globes in Germany, and brought them back with him to Cremona.

PILOT CHART FOR SEPTEMBER.—The U. S. Hydrographic Office reports in the Pilot Chart, issued Sept. 1st, a marked decrease in the number of icebergs off the Grand Banks, the Gulf of St. Lawrence being practically free of ice.

Attention is called to the fact that September is one of the worst hurricane months, and that the season lasts well toward the end of October.

The system of storm signals at Havana, during the

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\* The inscription is in broken lines, from top to bottom: Edebat Gerardus Mercator Rupel mundanus cum privilegio Ces (*sic*) Maiestatis ad an sex Lovanij an 1541.

hurricane season has been completed by the addition of the following night signals :

- A red light ..... Signs of bad weather.
- A red light over a white light.. Decided indications of bad weather.  
(No night signal)..... The port is closed.
- A white light over a red light.. Indications of clearing weather.
- A white light..... Clearing weather.

The signals are shown (day and night) both at the office of the Captain of the Port, and at the Morro Semaphore Station.

The charts published in August, were: No. 1225, Laguna de Terminos, Western Entrance; No. 1226, Wide Opening, Exuma Sound; No. 1228, Laguna de Terminos, Puerto Real Entrance; and No. 549 *b.*, Seto Uchi, or Inland Sea, Japan, sheet II, extensively corrected.

THE MISSISSIPPI.—Mr. Alex. D. Anderson has written a “Descriptive, Commercial and Statistical Review of the Mississippi and Its Forty-four Tributaries,” which has been printed by order of the U. S. Senate. This pamphlet presents within the compass of forty pages, illustrated by three diagrams, a striking picture of the great river and its importance to the nation. The drainage system of the river extends from Canada to the Gulf of Mexico, and from the summit of the Rocky Mountains to that of the Alleghanies; and from every part of this region, which embraces twenty-one States and the Indian Territory, the Mississippi can be reached by natural, or by artificial, waterways. These States furnished, according to the census of 1880, the following proportions of the products of the United States: Coal, 94 per cent., Pig-iron, 81 per cent., Corn

(maize), 89 per cent., Oats, 76 per cent., Wheat, 74 per cent., Hay, 60 per cent., Cotton, 68 per cent., Tobacco, 66 per cent., Sugar, 98 per cent., Wool, 56 per cent., Forest Products, 57 per cent., Swine, 82 per cent., Horses, 74 per cent., Mules, 77 per cent., Cattle, 73 per cent.

Their total product of grain was, in 1885, in bushels: Indian corn, 1,729,924,000; Oats, 514,100,000; Wheat, 241,722,000; Barley, 22,916,000; Rye, 15,464,000; Buckwheat, 5,655,000.

The alluvial lands of the Lower Mississippi, and its tributaries, subject to overflow by the rivers, cover an area of 41,193 square miles (26,363,520 acres). All but ten per cent. of these lands are susceptible of cultivation, and very fertile, but not more than 2,000,000 acres are cultivated, so great is the dread of the periodical inundations.

For protection against these, the Mississippi River Commission was appointed in 1879, "to take into consideration and mature such plan or plans as will correct, permanently locate, and deepen the channel, and protect the banks of the Mississippi River; improve and give safety and ease to the navigation thereof; prevent destructive floods; promote and facilitate commerce, trade, and the postal service." (*Act, Sect. 4*).

The Mississippi is the natural outlet for the trade of the United States with Mexico, Central and South America, and the West Indies, countries which now take from the Union but fifteen per cent. (\$64,090,000) of their foreign importations; and even of this proportion, less than one-sixtieth in value is shipped from New Orleans. Mr. Anderson's conclusion is that, with

the completion of works now in progress, there will come a vast development of the commerce with the nations to the south of the United States, and that this commerce must have its centre in the city of New Orleans.

THE OLYMPIC MOUNTAINS.—In December, 1889, the *Seattle Press* sent an exploring party to the mountain region lying between Puget Sound and the Pacific Ocean, and extending from the Strait of Juan de Fuca on the north to Lake Quinaiult on the south. The party returned early in the summer, and the notes of the explorers, with a number of portraits and views of scenery, and a large map of the Olympic Mountains, appeared in the *Seattle Press*, of July 16th. The map shows the country from  $47^{\circ} 20'$  to  $48^{\circ} 10'$ , N. Lat., and from  $123^{\circ}$  to  $123^{\circ} 40'$ , W. Long.

The Olympic Mountains are composed of several ranges, with a general direction from north-west to south-east, though the principal range, the Bailey, runs north and south; its highest point, Mount Olympus, being said to rise 8,550 feet above the sea. The four rivers, Elwha, Quinaiult, Queets and Quillayute, flow, not from Mount Olympus, but from Mount Seattle, a peak 7,700 feet in height.

The largest of the numerous valleys is the Quinaiult, which begins at Alexander River, and extends along the Quinaiult River and Lake in a southwesterly direction to the ocean. Lake Quinaiult, which is six or seven miles long and two miles wide, is wrongly represented on the United States Land Office maps. Instead of lying nearly north and south, with its outlet on the west-

ern side, the lake has a direction almost east and west, and the outlet is near the middle of the southern side.

All the country was well timbered, mostly with conifers.

The explorers named two valleys, six rivers, and thirty-nine mountains, in honour of various distinguished citizens. More deserved remembrance, but the mountains gave out.

U. S. GEOGRAPHICAL SURVEYS WEST OF THE ONE HUNDREDTH MERIDIAN, VOL. I, 1889.—This volume closes the record of the work done under the direction of Capt. Geo. M. Wheeler, Corps of Engineers, U. S. A., between the years 1869 and 1879. Captain Wheeler says, in a note added to his Letter of Transmittal: "This report, brought substantially to a close in June, 1879, was not presented for publication until 1887, from press of other duties and subsequent prolonged illness."

It contains, besides the Letter of Transmittal, and the Introduction; Five Chapters, treating, respectively, of the Areas Occupied, the Itinerary of the Colorado Grand Cañon, the Population, Industries, etc., the Indians, and the Land Classification; and Eight Appendices: A—List of Latitudes and Longitudes; B—Description of Atlas Sheet Maps; C—Formulated Methods, etc.; D—Notes on Survey and Disposal of Public Domain; E—Considerations upon National Government Surveys; F—Memoir upon Voyages, Discoveries, etc., to and at the West Coast of North America and the Interior of the United States west of the Mississippi, from 1500 to 1880; G—Synoptical Table of Contents of Quarto Volumes, etc.; H—Origin, Organization, etc., of Surveys



west of the One Hundredth Meridian. There are thirty-eight full-page Plates and three large Maps, and two Indices, one of subjects, the other of persons.

The portion of the United States territory west of the One Hundredth Meridian (excluding Alaska) covers 1,443,360 square miles. Of this area, the surveys accomplished under Captain Wheeler embraced 359,065 square miles, distributed as follows: In New Mexico, 80,052; in California, 64,906; in Nevada, 62,181; in Arizona, 61,876; in Utah, 38,969; in Colorado, 33,041; in Idaho, 8,877; in Oregon, 8,842; in Wyoming, 231; and in Texas, 150 square miles.

With regard to the cost of these Surveys, Captain Wheeler says, on p. 763:

“The cost for field and office work, including all expenses from the supply branches of the Army, with each and every expenditure chargeable to the work, was \$691,444.45. This sum has been reached after the most careful personal examination and much labor, and is an abstract from the actual vouchers of expenditure in all cases except the Quartermaster’s Department, and is complete and final, notwithstanding any and all statements to the contrary from other sources.”

The report, now finished, consists of seven volumes and a Supplement, one topographic and one geologic Atlas.

*Longmans’ School Geography for North America.*  
By George G. Chisholm, M. A., B. Sc., and C. H. Leete, B. A. New York, 1890.

Mr. Chisholm says, in his preface to the English edition of his book, that “while he has sought to ex-

clude from the text-book almost all details which the pupils cannot be expected to keep permanently in mind, and can hardly attempt to keep in mind without doing injury in some way to their mental training, he has kept constantly before him the necessity for taking care that what the text-book does contain should be really foundational—should consist of what is most effective as discipline, most important to know." This excellent plan commended itself to Mr. Leete, who wrote for the present edition the portions on America in general, North America, and the United States.

The work has been well done. Accuracy of statement has been kept in view, facts are presented with conciseness and in interesting language, and no important subject has been overlooked. The illustrations are well selected, but the printing is not always up to the mark.

As it stands, the work is without a rival among School Geographies in America.

The authors have purposely omitted maps, and for these the pupil is sent to his atlas.

*Report of the Royal Commission on the Mineral Resources of Ontario, and Measures for their Development. Printed by Order of the Legislative Assembly.*

*Toronto, 1890.*

The Royal Commission on the Mineral Resources of Ontario, was appointed in May, 1888, and has done its work with commendable promptitude. The Province is more than twice as large as the State of New York. It has no beds of coal, but it contains deposits, some of them immensely rich, of nearly every other mineral,

iron, gold, silver, copper, lead, nickel, plumbago, arsenic, mica, zinc, granite, marble, freestone, etc. These resources, though by no means neglected, have yet to be developed; and this development must come, as the Commissioners think, by closer and freer commercial relations with the United States.

Already, more than half of the capital invested in the mines and mineral properties of the Province is held by Americans.

The shortest route of travel and traffic between the Eastern and the North-western States of the Union lies across the Province, but the checks imposed upon commerce have so far almost neutralized the advantages of this position. This idea recurs again and again in the Report of the Commission, and the measures for the development of the Province of Ontario are found to be, practically, but one, the removal or the modification of the restrictions to which trade is subjected by the U. S. Tariff regulations.

Statistical information abounds in the Report. Besides a detailed account of the geology of Ontario, there are tables of export and production, with rules for the determination of minerals, notes on charcoal and charcoal iron, and a summary of the mining laws of various countries, and the provisions for technical education. A glossary of geological and mining terms is added, and there is a good Index.

GEOGRAPHICAL EDUCATION AT OXFORD.—Mr. H. J. Mackinder, M. A., Reader in Geography at Oxford, reports, in the *Proceedings* of the Royal Geographical Society for July, the progress made during the year.

Forty-two lectures were delivered—twenty-one on the Historical, twenty-one on the Physical, Aspects of Geography. In the Historical course the regions dealt with were Europe, The Mediterranean, Western Asia, India, and North America. Five lectures dealing with the British Isles attracted an audience of 50 members of the University; but the average attendance was 20. There were also two or three lady-students, and a varying number of residents of Oxford.

The twenty-one lectures devoted to Physical Geography were regularly attended by four members of the University, and one or two lady-students. Mr. MacKinder had expected the extinction of this class, and is led to hope that it will live and grow.

Lectures were also delivered in other towns to large audiences, including several hundred teachers; and also at Rugby and University College Schools.

A SUNKEN CITY NEAR ROVIGNO.—Dr. Vincenz Hilber sends to the *Mittheilungen* of the Vienna Geographical Society ( Band 33, No. 5 and 6 ) an abstract of a report, published in the *Transactions* of the Academy of Sciences, on the subject of a sunken city near Rovigno, in Istria.

Pliny the Elder mentions an Istrian island by the name of Cissa, and an extant letter speaks of the people of Cissa as an Istrian colony; and in the ecclesiastical records of the province of Aquileia for the years 579 and 679 occur the names of bishops of Cissa, in Istria.

Nothing more is known of the place, but some persons have been disposed to identify it with a spot to

the south of the island on which stands the lighthouse of Rovigno. At this spot the fishermen's nets are often entangled in masses of masonry and sometimes bring up fragments from the bottom of the sea; and some years ago a diver declared that he had seen walls and streets below the water. In January last an examination was made under official authority by a diver, sent down at a point marked by the intersection of two lines, one drawn from the tower of the Cathedral of Rovigno to the eastern end of the Scoglio San Giovanni in Pelago, the other from the Scoglio Bagnoli to the tower of Orsera. The depth of water was 85 feet.

"When I reached the bottom" says the diver, in his report, "I found myself surrounded by ruined walls, and was convinced, when I examined them, that they were the work of man, for, as a builder by profession, I recognized the layers of mortar.

"Continuing the exploration, I made out the direction of the line of walls, and the disposition of streets, but I did not see any doors or window-openings, these being hidden by masses of sea-weed and by all kinds of incrustations. I traced this regular masonry for a distance of 100 feet, but could go no farther, because the diving-bag and the cord did not permit. What I saw satisfied me that there existed in that place the ruins of a once-inhabited town, which through some catastrophe had gone down into the sea."

L'ÉGYPTE ET LA GÉOGRAPHIE.—Under this title the Khedivial Geographical Society has just issued a work by its Secretary, Dr. Frederic Bonola Bey, on the explora-

tions accomplished in Egypt under the auspices of the dynasty of Mohammed Ali.

Originally prepared as a report to be laid before the International Congress held in Paris, in 1889, the work has been retouched, and augmented by a few notes and an appendix. As it stands, the record is honorable to the rulers of Egypt, and must be taken into account in passing judgment upon their history.

The lines of exploration were practically laid down by Mohammed Ali's plans for the extension of his dominion, and, whether under his authority or that of his successors, the agents were, necessarily, for the most part, Europeans or Americans. Dr. Bonola has classified the work of each reign, and summed up, in four pages, the Egyptian contributions to geographical knowledge. These are, in part :

The astronomical determination of positions in the Delta, on the Nile to the Albert Nyanza, in Nubia, Kordofan, Darfur, on the Red Sea, in Harrar and on the Blue Nile ;

Triangulations in the Delta, the Fayum and Kordofan ;

Measurement of a base line in the plain of the Pyramids ;

Ascertainment of levels in the Delta and the Fayum, and on the Isthmus of Suez ;

Astronomical and hypsometrical observations ;

Reconnoissances and explorations in Arabia, in the deserts of Egypt and Nubia, in the western oases, to the east and to the west of the Nile, and along the river to the Victoria Nyanza, in Kordofan and Darfur, in the Harrar and on the coasts of Somali-land ;



The topographical survey of the Nile from the Mediterranean to the Equator, and the mapping of all Egypt Proper and many of the provinces ;

Geological researches in every part of the country from the Blue Nile to Syria ;

The creation of three cities,—Port-Saïd, Ismaïlia and Khartum,—vast improvements at Alexandria and at Suez, the establishment of light-houses on the Mediterranean and the Red Seas, and the building of railroads ;

The establishment of a postal and telegraphic service between Egypt and the Sudan.

Dr. Bonola notes the interesting fact that the last official dispatch received from the post-office at Khartum bore the date of November 4, 1884.

The Egyptian railroads have now, it appears, a total length of 1,194 miles.

*Ethiopie Méridionale. Journal de Mon Voyage aux Pays Amhara, Oromo et Sidama, Septembre, 1885, à Novembre, 1888., par Jules Borelli.*

4°, Paris 1890.

M. Borelli left Egypt on the 16th of September, 1885, and landed at Tadjurah, on the Gulf of Aden, January 1, 1886, having been delayed by the influence of the English agent at Zeilah. He reached Farré, the first town of Shoa in approaching from the east, in June. He stayed ten months in Shoa, tolerated by the king, Menelek, who was not pleased to see him. After a short visit to Harrar he returned to Antoto, Menelek's residence, and made preparations for his journey to the south. Starting in November, 1887, he climbed several

lofty mountains—Dendy, Harro, May-Goudo—and from Ali-Dhéra, where he found on the very summit Mussulman graves turned towards Mecca, traced the course of the Djimma Ghébié and the Omo rivers to their confluence. He found the Abbala lake, first indicated by M. d'Abbadie, who had never seen it.

M. Borelli's farthest point to the south was Mt. Bobbé, in 6° 30' N. Lat. Here he was stopped by the hostility of the natives, and returned in the direction of Antoto. On the way he endeavored to penetrate into the Zingero country, but barely escaped with his life from a furious assault upon his party. From Antoto he returned to the coast.

Throughout his journey he registered observations with his instruments, took photographs, mapped the regions traversed, studied the races, and wrote out vocabularies of languages.

His collections, mostly ethnographical, have been presented to the French Government.

The divisions and subdivisions of races in Ethiopia are, according to M. Borelli, hardly to be classed under any general name. There is not, in his opinion, any such thing as an Abyssinian, Dankali, Somali, Oromo, or Galla, race; though he is inclined to believe that all these have a common origin and that the primitive type may still be seen in some of the Oromo tribes. He observed that, wherever Islamism had penetrated, the type had degenerated. In some regions the mixture with negro blood was evident, while in others this was almost wholly wanting; and among the Zingero a decidedly Asiatic type of face was occasionally seen. The head of a young Hadia girl, engraved on page 337, would be

taken anywhere for the copy of a portrait from an Egyptian temple.

M. Borelli finds not much to praise in the people of Ethiopia.

They are all given, more or less, to lying and gluttony and thievery and exceeding dirt. The king of Djimma, being asked how it was that his subjects had contracted the habit of lying, answered : " I can't tell you why, but so it is. Our fathers always told lies, from time immemorial, and we lie, and our descendants, when their turn comes, will tell lies."

M. Borelli was at Antoto, king Menelek's residence, on the occasion of a religious festival that lasted five days. The king entered the city at the head of a procession. Cannon were fired, and the soldiers discharged their loaded muskets. The streets were crowded with priests in bright-colored robes, and wearing, some of them, gilded or silver head-dresses. They were all tipsy, and sang as they reeled along.

The king gave a dinner to a thousand persons, who sat in tents. After this he came out and had a monster feast, prepared for four thousand men. Great troughs, made of trunks of trees, were filled from time to time with drink, and the soldiers quenched their thirst like horses. When they were no longer able to stand, they were dragged out of the enclosure. To mark the religious character of the festival, the priests eat and drank more than the others. Six hundred cattle were killed for one day's repast.

The Omo River, which was traced through a great part of its course, flows first towards the north, then curves and flows south-east and south, then to the west-

ward and finally to the south, and enters Lake Shambara or Samburu, in E. long.  $35^{\circ} 35' 22''$ . This lake lies beyond M. Borelli's farthest point to the south, but he identifies it with the Basso-Narok, discovered by Count Teleki and Lieutenant von Höhnel, and by them named Lake Rudolf ; and these gentlemen, with whom M. Borelli compared notes at Cairo, seem to have accepted the identification.

In the *Journal* the entries are printed as they originally stood, each under its date ; an arrangement less satisfactory to the reader than the division into chapters. Even with this drawback, the book has the greatest value as a contribution to the knowledge of Abyssinian geography and ethnology.

Of the typography and the maps and the numerous illustrations, it is enough to say that they are in the style of Quantin's publications.\*

CASATI'S EXPLORATIONS.—Under this heading Capt. Antonio Cecchi writes to Prof. G. Dalla Vedova from Aden, on the 30th April, a letter, which appears in the *Bollettino* of the Italian Geographical Society for May. The letter covers, including a table of itineraries and notes, only six pages, and sets forth from Casati's own memoranda some of the work that he accomplished during his ten years' stay in Equatorial Africa. It was Casati who first informed Emin of the existence of the snowy mountains, now familiar to all as the Ruwenzori range. In one of his letters, written from Uhaiya, Unyoro, on the 1st of April, 1887, Casati describes these mountains,

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\* The imprint is : Paris, Ancienne Maison Quantin, Librairies-Imprimeries Réunies, May & Motteroz, Directeurs, 1890.

under the name of Varimcampanga, as situated to the north-east of Lake Ruitan (Albert Edward) and as inhabited by people of the Wakonju stock, light-colored, and speaking a tongue of their own; and he makes the distance from Uhaiya to Lake Ruitan, twenty days' march. The Ruitan-Nzige (the form *Muta-Nzige* is declared to be erroneous) is, according to Casati, incorrectly laid down on the maps. The northern extremity extends but a few miles beyond the equator. This fact was established by astronomical determination of latitudes. It was found, also, that the outlet of the lake, the Semliki River, flowed first to the north-west, described an ample curve, with its convexity to the west, and entered the Albert Nyanza at its southern extremity. The bed of the Semliki (it is not stated at what point) was 2,182 feet above the level of the sea.

From Muchora, a village in the country of Ukonju, at an elevation of 3,700 feet, the loftiest peak of the Ruwenzori, covered with snow, was seen towards the north-east, and to the southward lay the great tableland, extending as far at the Ruitan-Nzige. From Muchora a pass led over the foothills of the Ruwenzori, at a height of 5,174 feet, into the country of Usongoro.

Casati assigns to a place, to which he gives the name of Niamogogiò, situated in the the territory of Uzinza, a position distant only about 1,300 feet from the Victoria Nyanza; and Captain Cecchi observes: "From this it clearly appears that the Victoria Lake, as it is marked in the recent map of Perthes, is not exact. It should undergo a displacement in its southern portion, and pre-

cisely in a south-south-west direction, of at least 120 kilometres (74 miles)."

This corroborates Stanley's rectification of his own surveys, and leaves the true extension of the Victoria Nyanza a yet unknown quantity.

As long ago as October, 1881, Casati succeeded in finding the grave of Miani, and collected his bones and a pipe, which had belonged to him, with the purpose of removing them to Italy for burial. These precious relics, and all his own notes, were taken from Casati when he was held a prisoner by Kabba Rega, the King of Unyoro; but he still possesses, it must be hoped, the record of his six years' companionship with Emin, and will tell the story to the world. The very qualities of modesty and single-heartedness, which have kept him in the background, will give authority to his utterance.

CARTOGRAPHY OF PORTUGUESE AFRICA.—The Portuguese Government continues the systematic survey of its African possessions and publishes the results in maps and charts, always on an ample scale, and executed in a style that does credit to the Comissão de Cartographia. Recent issues are:

Carta da Ilha de S. Thiago (Cabo Verde).

Plano Hydrographico da Bahia do Tarrafal (Ilha de S. Thiago).

Plano Hydrographico do Fajão d'Agua, Ilha Brava (Cabo Verde).

Reconhecimento Hydrographico da Foz do Pungue (Prov. de Moçambique).

THE UPPER IRAWADI.—*Nature*, of July 31, takes



from the Allahabad *Pioneer* the report of an attempt to explore the upper course of the Irawadi.

This river is formed by two streams, the Mali Kha from the north and the Meh Kha from the east, which come together a little below lat.  $26^{\circ}$ . The sources of the Mali Kha were known already to be to the east of the Brahmakund, but the Meh Kha, supposed to be the larger and, perhaps, identical with the Lu River of Tibet, had never been seen by any European. On the 27th May, Captain Barwick, Mr. Shaw, and Major Fenton left Bhamo in the *Pathfinder*, a paddle-steamer of 35 tons, for the confluence of the two rivers. Above Maingua, up to which point the river is known, the Irawadi runs between mountains from 1,200 to 2,000 feet high. The rapids in this part of the voyage were numerous and very dangerous to the little steamer, but after six days the confluence was reached, at about 150 miles from Bhamo. The river was 500 yards wide, the Mali Kha branch trending to the north-eastward, the Nmaika (Meh Kha) to the eastward. The Mali Kha was ascended for six miles to a series of rapids, which were not attempted, there being but little fuel left. The position was fixed in lat.  $25^{\circ} 56'$  N., and long.  $97^{\circ} 38'$  E.

The Nmaika was also ascended, but only for three miles, to a rapid, which could not be passed.

THE RED RIVER ROUTE TO YÜNNAN.—According to the *Returns of Trade, Part II., for 1889*, published by order of the Inspector-General of Customs, China, the French have the advantage in the competition for the trade of Yünnan.

The Report of the Commissioner at Mengtzu, in

Yünnan, mentions six trade routes leading into the province: five from the east and south, and one from Bhamo, in Burma. This last is neglected as a "problem of the future"; the others are described.

The first route is that from Hankow, a 40 days' overland march, with heavy transit duties on goods. The second leaves the Yangtze above Hankow and passes by Yung-ning; a journey of 19 days by water and more than 20 by land, 39 in all.

The third and most important route for merchandise is by a land journey of 22 days from the Yangtze, above Hsü-chou-fu, and near the north-eastern frontier of Yünnan. The net amount of annual dues paid at the Barrier on this route, just within the boundary line, is reported at 240,000 Taels (\$276,000), of which 75,000 Taels are on opium and nearly the same number on salt.

The fourth route starts from Pakhoi, in the province of Kwang-Tung, at the head of the Gulf of Tonquin, and passes by Po-sê. The journey by this route is accomplished in 54 days. Po-sê is a great outlet for Yünnan and Kweichow opium, for the purchase of which 1,000,000 Taels in silver annually pass through the place. The tin of Yünnan is also sent from Po-sê to Pakhoi, and the Commissioner of Customs at this port estimates its trade with Yünnan in foreign cotton and woollen goods at 1,450,000 Taels, yearly. None the less, the opinion of the merchants at Po-sê was that, if frontier trade at Mengtzu succeeded, they would suffer; and many houses have already recalled their agents. This is the result of less than one year's competition with the French route.

The fifth route is the one through the French territory, *via* the Red River. The stages are : From Haiphong to Hanoi, by steam, 1 day ; Hanoi to Laokai, by junk, 20 days ; Laokai to Manhao, by junk, 7 days ; Manhao to Mengtzu, by pack-animals, 3 days ; and Mengtzu to Yünnan-fu, by pack-animals, 9 days. Besides the gain in time, the transit dues by this route are very light, and the French authorities aid the development of trade by their liberal measures. As to cost, the Commissioner reports that a box of 60 catties in weight (80 lbs.), half the load of a mule, can be delivered at Mengtzu, from Hong Kong, for 2.30 Taels ; while it costs about the same sum for mule hire alone from Po-sê.

Mengtzu is not merely a distributing point for boxes and bales ; it is an enchanted land, second only to Michigan or Utah. Who can read without emotion the words of the Commissioner ?

\* “ Michigan’s proud challenge to the world is, ‘ If you wish to see a beautiful peninsula, look around : ’ with the change of one word, Mengtzu may with equal appropriateness venture such language with regard to her location. Built on a cultivated plateau, 20 miles long by 12 miles wide, level as a threshing floor, though 4,500 feet above the sea, she commands an unobstructed view of the mountains which encircle the plain. Though devoid of trees, such an important element in the charm of mountain scenery, the surrounding heights make up for their nakedness by the glow of the most beautiful shades of red and brown, purple and

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\* The State motto is : *Si quaeris peninsulam amoenam, circumspice* ; a travesty of the inscription on Sir Christopher Wren’s tablet.

gold, made glorious in the clear atmosphere of this high altitude by the bright rays of an almost perpetual sunshine.

"In its location and environment, not forgetting the pretty lakes of clear water (although fresh) in the neighborhood, Mengtzu, on a smaller scale, may be compared with Salt Lake City, and almost compete with it in the charm of its picturesque situation."

PE-CHILI.—M. Romanet du Caillaud makes a communication to the Paris Geographical Society (*Compte Rendu*, 1890, No. 12 and 13, p. 357), on the subject of the names *Pé-Tchi-Ly* and *Nan-Tchi-Ly*. He says: "The imperial province of the Chinese Empire now bears the name of *Tchi-Ly*; it was formerly called *Pé-Tchi-Ly*, that is, the *Northern Tchi-Ly*. This supposes that there was formerly a *Nan-Tchi-Ly*, that is, a *Southern Tchi-Ly*; and, in fact, under the Ming dynasty (1368-1649), when Kiang-Ning-Foo (Nanking) was the Southern Court, the province of Kiang-Nan, of which Nanking is the chief city, was known as *Nan-Tchi-Ly*; and Chun-Thien-Fou (Peking) being then the Northern Court, its province was known as *Pé-Tchi-Ly*. Now that Chun-Thien-Fou (Peking) is the only imperial court, its province alone is called *Tchi-Ly*, and is, consequently, no longer to be distinguished by the addition of the prefix *Pé* (north)."

If not new, this is, for the most part, a correct statement of the case; but the conclusion may be questioned. Professor Egli agrees with M. Romanet du Caillaud: "Now, under the Manchu dynasty, which has but the one Capital, Pe King, there is only one *Tschi-Ly*, and

the *Pe-Tschy-Li*, corruptly written *Petscheli*, of our maps is antiquated." \*

Some German cartographers have adopted the form *Tschy-Li* for the name of the province, though they still write *Meerbusen*, or *Golf von Pe-tschy-li*. With sounder judgment the editors of Stieler's Hand Atlas retain for the province, as well as for the gulf, Professor Egli's "antiquated" form.

The objection to the change is, that it has no significance for any people, except the Chinese; and European maps are made, not for the Chinese, but for Europeans. The principle of the reform, advocated by M. Romanet du Caillaud, and Professor Egli, involves the abolition of the names, *Peking* and *Nanking*, and the recasting of the whole map of China, beginning with the name of the Empire.

THE MORIORI.—In *The Transactions and Proceedings of the New Zealand Institute*, Vol. XXII., is a paper by Mr. Edward Tregear, on the Moriori, the original inhabitants of the Chatham Islands, which lie about 400 miles to the eastward of New Zealand. There are but twenty-seven of these people now alive, of pure descent, and five half-breeds; and the other inhabitants of the group of islands are about two hundred and fifty Maoris, and as many whites.

The Moriori are akin to the Maori in appearance, and in language, though somewhat shorter and broader

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\* Jetzt, unter der Mandschudynastie, welche nur die eine Hauptstadt Pe King hat, gibt es nur ein *Tschy-Li*, und ist das *Pe-Tschy-Li*, corruptirt *Petscheli*, unserer Carten antiquirt.

(Nomina Geographica, art. Tschy Li.)

in person. They are remarkable for the size of their hooked noses.

They do not tattoo, and do not know the art ; they appear to have had a regular marriage ceremony ; and they dispose of the dead in a peculiar manner. If a man celebrated as a fisherman died, the body was lashed in a sitting posture to a canoe, and sent out to sea ; if the dead man had been a bird-catcher, his body was fastened to a tree with the face turned towards the place he had most hunted over in life. The women ate apart from the men.

The ancient huts were either  $\Lambda$ -shaped, or conical, and formed by bundles of poles tied together at the top. Children were baptized, with ceremonies accompanied by the planting of a tree, as in New Zealand.

In 1832, two Maori tribes made a raid upon the Chatham Islands, and took possession, treating the peaceable Moriori, literally, like sheep.

The Moriori traditions, justly described as extraordinary and valuable, if authentic, carry back their genealogy through 184 generations ; or nearly 3,700 years, at twenty years to a generation. The roll begins with Rangi and Papa (Heaven and Earth). In the 157th generation when Rongopapa was living, canoes arrived in the islands from Hawaiki, or Hawaii. The old chief Tapu, now living, affirmed that his people were the original children of the soil, and that the canoes mentioned were the first arrivals from Hawaiki. Mr. Tregear, however, thinks it evident from their vocabulary and songs, and their genealogy, that the Moriori came from the same far-off Hawaiki. He gives



the old names of the months, all names of persons, and unlike the Maori words. One sound in these names, written *tch*, is only met with elsewhere, in Tonga, and the other Friendly Islands.

There are legends of an enormous bird which once existed on the largest island. The name given to it, *Poua*, almost identifies it with the mythical gigantic man-eating bird *Pouakai*, of the South Island of New Zealand.

The home of this little people is the island of Rekohu.

AUSTRALIAN PLANTS.—Baron Ferdinand von Mueller, Government Botanist for the Colony of Victoria, has just brought out, “The second Systematic Census of Australian Plants, with Chronologic, Literary and Geographic Annotations; PART I.—VASCULARES.”

The plant-world of Australia is Baron von Mueller’s acknowledged domain.

He dedicates the book in these words :

TO

SIR JOSEPH HOOKER, K.C.S.I., C.B., F.R.S., V.P.L.S.

AND TO

M. ALPHONSE DE CANDOLLE, F.M.R.S., F.M.L.S.,

WHO AS HEIRS OF GREAT NAMES WORTHILY SUSTAIN WORLD-WIDE ANCESTRAL FAME,

AND WHO AS LEADERS IN PHYTOGRAPHY DURING HALF A CENTURY WILL BE PRE-EMINENT IN BIOMORPHIC SCIENCE THROUGH ALL AGES,

THESE PAGES

ARE OFFERED AS AN APPRECIATIVE TRIBUTE,

FROM A YOUNG COLONY IN ANTIPODAL REMOTENESS.

TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

EDINBURGH.—*The Scottish Geographical Magazine.*

The Emin Pasha Relief Expedition: Address to the Society. By Henry M. Stanley, Commanding the Expedition—A Voyage Inland from Canton. By Dr. W. G. Dickson—Proceedings of the Royal Scottish Geographical Society—Russian Laplanders. By V. Dingelstedt—“In Darkest Africa,” Reviewed by John Geddie, F.R.G.S.

GOTHA.—*Petermanns Mittheilungen.*

The Cloudiness of Central Europe (including the Carpathian countries)—Survey of Molo Strait (W. Coast of Flores, in Malay Archipelago)—The Calculation of Mass of Elevations and Depressions of the Earth's Surface—General A. von Tillo's Hypsometrical Map of European Russia—Dr. Suess's View of the Structural Features of East Africa—Involuntary Migrations in the Pacific Ocean—The Nicaragua Canal—The Distribution of Salt held in Solution in the North Atlantic Ocean—The New Boundaries in Africa—Dr. Lüddecke's Map of Africa (in 6 sheets)—Mangarai Strait (a correction of a statement in the article on the “Survey of Molo Strait”).

LISBON.—*Sociedade de Geographia, Boletim.*

Expedition to Portuguese Guinea, to fix the Boundary Line between the French and the Portuguese Territories. By E. J. da Costa Oliveira—Chorography of the Island of S. Thiago (Cape Verde)—Historical Notes on

the Peninsula of Arrabida (on the Bay of Setubal)—On the Conquest of the Mines of Monomotapa—The British Ultimatum. Communications sent and received by the Lisbon Geographical Society.

LONDON.—*Royal Geographical Society, Proceedings.*

The Annual Address on the Progress of Geography: 1889-90. By the Right Hon. Sir Mountstuart E. Grant Duff, G. C. S. I., President—Further Explorations in the Solomon Islands. By C. M. Woodford—Geographical Education: The Year's Progress at Oxford—Explorations in Cilicia Tracheia. By J. Theodore Bent—Obituary: Edward Colborne Baber—Anniversary Meeting—Geographical Dinner to Mr. H. M. Stanley.

MADRID.—*Sociedad Geográfica de Madrid, Boletín.*

The Material for the Teaching of Geography and its Rational Employment—Memorial Discourse on the Conde de Toreno, ex-President of the Geographical Society—Memorial Discourse on D. Hilario Nava y Caveda, ex-Vice-President of the Geographical Society—Report on the Progress of Geographical Work. By D. Martin Ferreiro, Secretary—Dr. Vicente de la Fuente, Member of the Society—Voyage of Circumnavigation Accomplished by the Ironclad *Numancia*, in 1865-67—Authentic Notices of the Famous River Marañón.

PARIS.—*Société de Géographie, Compte Rendu.*

The Dunes of the Sahara (Capt. A. Bernard)—Railway across the Sahara—Maps (the work

of M. G. Camus) showing the Accumulation and the Depth of the Snow in the Valleys of the Alai and the Pamír, in March and April, 1887—Geographical Congress at Montpellier—Dr. Catat's Scientific Mission in Madagascar—M. Dybowski's Report on his Scientific Mission to the Southern Portion of Algeria—Unification of Time—M. Garnier on the formation of the Dunes of the Sahara—M. Drapeyron's presentation of Works by M. Gabriel Marcel—M. Antoine d'Abbadie's *Géographie de l'Ethiopie*—Report on Casamanca and Fuñi (W. Africa) by Capt. Brosselard Faidherbe—Reception of M. Fernand Foureau, explorer of the Central Sahara.

*Bulletin.*

Report on the Work of the Society and on the Progress of Geography in 1889, by M. Charles Maunoir—Unification of Time. By W. de Nordling—The Scientific Cruise of the U. S. Schooner *Grampus* in 1889. By J. Thoulet.

ROME.—*Società Geografica Italiana, Bollettino.*

Explorations of Gaetano Casati—The Uaupes River and the Tribes of the Uaupes—On Italian Emigration and Colonization, especially in South America—Native Carvings in the Region of the Upper Orinoco—Lamberto Loria in New Guinea—Report of the Progress of the Work of the Columbian Commission—A Journey in South Africa—The Density of Population in Europe (noting the error in

the accepted belief that Belgium is the most densely populated country) — Mercator's Globes in Italy—The *Al Brasile* of Lomonaco.

VIENNA.—*Kais. Königl. Geographischen Gesellschaft, Mittheilungen der.*

Von Brenner-Felsach's Travels in the Independent Battak Country (Sumatra) and in the Island of Nias—Oscar Baumann's Map of the Middle Congo—The Last Glacial Period of the Central Alps to the North of the Brenner—Diver's Report on the Sunken City at Rovigno in Istria—An Excursion in the South-eastern Caucasus—The Former and the Present Highest Levels in Venice.

WASHINGTON.—*National Geographic Magazine.*

The Rivers of Northern New Jersey, with notes on the Classification of Rivers in General: William Morris Davis—A Critical Review of Bering's First Expedition, 1725–30, together with a translation of his original Report upon it: Dr. William H. Dall—Supplementary Note on the Alleged Observation of a Lunar Eclipse by Bering in 1728–29: Marcus Baker.







## WASHINGTON LETTER.

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WASHINGTON, SEPT. 23, 1890.

MARINE METEOROLOGY, etc.—The Pilot Chart of the North Atlantic Ocean for September, (issued by the Hydrographic Office, Navy Department) is, as usual, filled with information of importance to the navigator and of interest to every one. A feature of new and special interest is the publication on the chart itself of two small charts,\* with isothermal lines showing the mean surface temperature of the ocean between New York and the 40th meridian, north of the 40th parallel, for the first and second half of August. Very few realize the large number of reports that the Hydrographic Office receives from masters of vessels of every nationality, all of whom seem even more willing to help our Office than the corresponding offices of their own governments, on account (so they say) of the prompt and practical character of our publications. These surface temperature charts, for instance, were actually issued before the month of August had quite ended, and yet more than six hundred observations had been received in time to use in preparing the chart for the first half of the month, and about three hundred for the second. The special value of such prompt publication lies in the fact that the charts are of immediate use in transatlantic navigation, and not merely of scientific or historic value, as is generally the case in work of this kind.

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\*See Charts.

The navigator of an ocean steamship is very largely guided in his route by the surface temperature, inasmuch as warm water indicates in this region, the easterly Gulf Stream current, and cold water inshore, or the Labrador, current. The competition is so great that every hour counts, and the object is to try to cross the Grand Banks in such a latitude as to have some 20 or 24 knots of current per day *with* the vessel, instead of an equal amount *against* her. And this is not merely a question of making a good record, but a question of economy as well. A big twin-screw steamer burns about fifty dollars' worth of coal an hour, so that the difference in one day due to current may amount to \$150.

The record of the two charts shows that the Gulf Stream had even surpassed its usual midsummer northern limit: the isotherm of 80° F. runs almost due east along the 41st parallel, from the 64th to the 40th meridian, while that of 60°, which may be assumed, roughly speaking, as the limit of the Labrador current, skirts the coast within about 100 miles all the way from Cape Cod to Cape Race, although it runs down along the eastern edge of the Banks in a long wedge-shaped projection. There the sudden change of the temperature is so marked that a navigator can actually determine his longitude by it, with greater accuracy than was possible with the best instruments before the days of the modern chronometer. It is in this cold wedge of Arctic current that icebergs linger far into the summer, and some are shown now on the chart, close to the edge of the Gulf Stream.

A buoy, whose position is plotted on the chart about 600 miles E. N. E. from Bermuda, under date of June

27, has a most interesting history. It has been identified as the iron canbuoy that went adrift from Port Royal, S. C., toward the end of November, 1886. Fortunately it was marked in such a way as to be easily identified, being painted in black and white vertical stripes, with the letters "P. R." in black on one of the white stripes. This buoy has been adrift for three years and seven months, and may be heard from again. It is in the western part of the Sargasso Sea, that region of light variable currents, between Bermuda and the Azores. This is probably the longest drift on record, so far as time is concerned, although distances traversed have been greater; the famous derelict American schooner *W. L. White*, for instance, wrecked and abandoned off Delaware Bay during the "March Blizzard" (1888), drifted over to the Scottish coast, and grounded on one of the Hebrides. Another famous and almost incredible case is that of the British ship *Ada Iredale*, an iron, coal-laden vessel. Abandoned on fire in the South Pacific, in October 1876, she drifted 2,400 miles westward and was towed into Tahiti still burning, in June 1877. She continued to burn till May 1878, when she was repaired, and, as a handsome bark named *Annie Johnston*, has done good service in the trade with China. Verily, "truth is always strange—stranger than fiction."

Captain Henry F. Picking has been relieved from duty as Hydrographer, Navy Department. Lieutenant Richardson is acting Hydrographer.

The Hydrographic Office has published an abstract of the Proceedings of the International Meteorologic Congress held in Paris, September 19-26, 1889.

Lieutenant Aaron Ward, naval attaché at the U. S.

Legation, Paris, who had been delegated by the Secretary of the Navy to represent the Hydrographic Office, presented to the Congress a series of maps and books published by the Hydrographic Office. Aside from a few remarks which he made on that occasion, there is a conspicuous absence in the "Proceedings" of any discussion by North American Meteorologists, or any allusion to their eminent services.

IRRIGATION.—In order to understand the status of the question concerning the irrigation of the arid regions of the United States, it will be necessary to review briefly proceedings in Congress on the subject during the present session.

In the bill making appropriations for sundry civil expenses of the Government for the fiscal year, ending June 30, 1891, the House of Representatives agreed to the following section :

" For the purpose of investigating the extent to which the arid region of the United States can be redeemed by irrigation and for the investigation of the sources of water to be used in irrigation, and the segregation of irrigable lands in such arid region, and for the selection of sites for reservoirs and other hydraulic works necessary for the storage and utilization of water for irrigation and for ascertaining the cost thereof, and the prevention of floods and overflows, and to make the necessary maps, including the pay of employes in the field and in office, the cost of all instruments, apparatus, and materials, and all other necessary expenses connected therewith, the work to be performed by the Geological Survey, under the direction of the Secretary of the Interior, *seven hundred and twenty thousand* dollars. . . .

For engraving of maps, including the pay of employés, the cost of apparatus, instruments, and materials, and all other necessary expenses connected therewith, *fifty thousand dollars.*"

When the subject was reached in the Senate it encountered determined and violent opposition, chiefly from Western Senators, although these were largely strengthened by others from all sections of the country, without political distinction. The debate, which extended over several days, developed a hatred for the whole scheme, based on the official interpretation or construction of a section of the Act of October 2, 1888, which provided that, "all land which may hereafter be designated or selected by the United States surveys for sites for reservoirs, ditches, or canals for irrigation purposes, and *all lands made susceptible of irrigation* by such reservoirs, ditches or canals, are from this time henceforth reserved from sale as the property of the United States, and shall not be subject after the passage of this act, to entry, settlement, or occupation until further provided by law." The Commissioner of the General Land Office in a circular to U. S. Registers and Receivers, after reciting the above section said: "The subject sought to be accomplished by the foregoing provision is unmistakable. The water sources and the arid lands that may be irrigated by the system of national irrigation are now reserved to be hereafter, when redeemed to agriculture, transferred to the people of the Territories, in which they are situated, for homesteads. The Act of Congress and common justice require that they should be faithfully preserved for these declared purposes. . . . Neither individuals nor corporations have a right to make filings



upon any lands thus reserved, nor can they be permitted to obtain control of the lakes and streams that are susceptible of uses for irrigating purposes. You will, therefore, immediately cancel all filings made since October 2, 1888, on such sites, . . . and you will hereafter receive no filings upon any such lands."

It was stated during the debate that under the above ruling an area of 1,350,000 square miles had been withdrawn absolutely, all entries for pre-emption, homestead, etc., having been suspended, resulting in hardships in delaying and in staying the progress of all that country. The former adherents of the scheme for irrigating the arid regions became its most bitter opponents, and some of them showered ridicule and contempt upon topographical surveys, and geological surveys, and nearly everybody connected with them. The Director was styled "a Tycoon with many tales." One member said that nothing needed a more thorough survey than the Geological Survey itself. Like Falstaff, it had grown out of all compass, and like Sir John, seemed to be not only "a falsifier itself, but a collaborator of untruths;"—"a magnificent fabric of fabrications:" That there was not money enough in the Treasury to pay for a "geological-topographical-paleontological-irrigation map of the United States. It was claimed that under a different construction of the law, only the identical lands that were to be covered with water were to be reserved; that a topographical survey of the whole region was wholly unnecessary, and that irrigation would not be benefited thereby, but that the settlement of the whole western country would be set back for the period of a generation. Said Senator Stewart: "Inasmuch as we

have failed to get reservoir sites marked out on the maps, or to get the land which can be irrigated segregated from other lands, and as we have spent \$350,000 with no good results, I am willing to quit and let the people do the balance. Repeal these laws, restore the *statu quo* as it was before this law was passed."

The Senate, *nem. con.*, struck out the House provision and substituted the following: "For topographic surveys in various portions of the United States \$300,000, one-half of which sum shall be expended west of the 101st meridian; and so much of the Act of October 2, 1888 as provides for the selection and location of reservoirs and canals upon the public lands, and the reservation of irrigable lands, is hereby repealed: Provided, that reservoir and canal sites heretofore located or selected shall remain segregated and reserved from entry or settlement until otherwise provided by law."

The House of Representatives yielded to this proposition in a modified form, viz.: "For topographic surveys in various portions of the United States, \$325,000, one-half of which sum shall be expended west of the 100th meridian; and so much of the Act of October 2, 1888, as provides for the withdrawal of the public lands from entry, occupation and settlement, is hereby repealed, and all entries made or claims initiated in good faith, and valid but for said Act, shall be recognized and may be perfected in the same manner as if said law had not been enacted, except that reservoir sites heretofore located or selected shall remain segregated and reserved from entry or settlement as provided by said Act, until otherwise provided by law, and reservoir sites hereafter located or selected on public lands shall in like manner be

reserved from the date of the location or selection thereof. No person, who shall, after the passage of this act, enter upon any of the public lands with a view to occupation, entry or settlement under any of the land laws, shall be permitted to acquire title to more than 320 acres in the aggregate, under all of said laws, but this limitation shall not operate to curtail the right of any person who has heretofore made entry or settlement on the public lands, or whose occupation, entry or settlement is validated by this act : Provided : That in all patents for lands hereafter taken up under any of the land laws of the United States or on entries or claims validated by this act west of the 100th meridian, it shall be expressed that there is reserved from the land in said patent described a right of way thereon for ditches or canals constructed by the authority of the United States."

That part of the arid land legislation of 1888, which has been repealed by this new act, has been a great check to the business of the General Land Office, and final action on entries in practically all the region west of the 100th meridian has been suspended. All these cases will now pass to patent. The provision limiting to 320 acres the amount of land that can be patented to one individual practically abolishes the Desert Land Act, and one or two other of the land laws. Under the Desert Land Act a man could make entry of 640 acres; he could also make a pre-emption, a homestead and a timber culture entry. The last three laws limited each entry to 160. The provision exempting from settlement reservoir sites, and providing for the right of way through private land for irrigating canals, is ample to carry out the proposed irrigation of the desert lands.

Several prominent assistants whose views are not in accord with those of the Director, are no longer connected with the Survey.

ALASKA BOUNDARY SURVEY.—It will not be forgotten that the United States Coast and Geodetic Survey is carrying on a preliminary survey of the frontier line between Alaska and British Columbia and the North-west Territory, in accordance with plans or projects approved by the Secretary of State. Two parties, in charge of J. E. McGrath and J. H. Turner, respectively, have been engaged near the frontier line on the Yukon and Porcupine rivers since the summer of 1889. Letters as late as June 15, 1890, have been received from Mr. McGrath.

During the summer and fall months of 1889, clouds nearly always covered the sky, so that the astronomical work of the party has been much delayed. Added to this, the rainfall has been very heavy. But the men of the party worked willingly and energetically in preparing for the winter. The wood supply in the neighborhood of the camp was poor,—not enough to last a month, so that it was necessary to go four and five miles to chop trees, which then had to be dragged from one to three hundred feet through tangled undergrowth to the streams. About 52 cords were secured.

When the party left St. Michaels, part of the supplies were left behind to be brought up in the steamboat *Arctic*, belonging to the Alaska Commercial Company, so as to reach the camp ("Camp Davidson, on Yukon River, near boundary of Alaska") not later than September 20th. Of the supplies that were carried along much the largest part was appropriated to the Porcupine

River (Turner) party, because of the uncertainty of any opportunity for later transportation to that region. But as late as October Mr. McGrath learned by messenger that the *Arctic* had been lost, before she entered the Yukon River. But few of the supplies were saved, and those in bad condition, so that when winter set in the amount of stores on hand allowed about 90 pounds of food per man per month, gross weight, which included juices, cans, etc. The amount of flour was 5 pounds a month for each man. The position was fully explained to the men, and not one asked to be discharged or expressed a wish to leave. Two men (James McLarty and James A. French) were sent down the river to a point about 150 miles below Fort Yukon, to secure if possible some of the provisions which had been sent forward from the wrecked *Arctic*. They set out on the return trip in February, with a hand-sled and a toboggan drawn by three dogs. These they loaded with flour and beans, and after seventy days' journey got into Camp Davidson on the 2d of May, having travelled 350 miles. Most of the route was gone over thrice, because they could not haul their load all at a time. They would go forward with half, cache it and go back for the remainder. When they reached camp they had only the clothes on their backs, one pair of blankets and no coats. For the last four days they cut off the tops of their boots to feed the dogs, gave them deer-skin sinew and line from the toboggan, and whatever else they could spare. Their own clothes they cached on the road.

Under date of June 15, 1890, Mr. McGrath writes that the party has been materially retarded by the nature of the weather that had prevailed, and that they

will have to remain a second winter at the camp. Monthly reports and daily journals have been kept giving a detailed account of the work done, and the manner in which the party has been employed. A collection has been made of the plants growing in the neighborhood, and all the different insects have been gathered. A number of birds were shot, but many have spoiled. The health of the party has been excellent. Mr. McGrath was unable to get any Indians to go across to Mr. Turner's camp, 200 miles north of Porcupine River; an offer of \$40, and provisions for the journey not being sufficient to tempt them. He could not send any of his own party, as he had only two dogs and these animals would not be able to take what would be required for their own needs.

CHARLESTON EARTHQUAKE OF 1886.—Three hundred and twenty-six pages of the Ninth Annual Report of the Director of the U. S. Geological Survey, just printed, are taken up by a report on "The Charleston Earthquake of August 31, 1886," by Capt. (now Major) C. E. Dutton. Twenty-four hours after broken communications were restored found a geologist of the Survey and its accomplished photographer in the streets of Charleston, making permanent record of all the most striking and important features of the great catastrophe. A representative of the U. S. Signal Service, who is now the Superintendent of the U. S. Coast and Geodetic Survey, was upon the ground a day later. The great amount of thoroughly accurate information secured by these gentlemen, supplemented by the results of a very conscientious examination by Mr. Earle Sloan of every detail in the region most affected, and by the informa-



tion secured by Ensign Everett Hayden, through a large correspondence with every part of the country where shocks were noted, is condensed by Major Dutton into a report of exceeding interest. This paper, with its striking illustrations secured by the camera, will give one an impression of the earthquake much more vivid than any of the descriptions yet published, and must remain the historic record of that great catastrophe.

Some of the photographs taken at the time show the effect of the peculiar motion of the earthquake wave in a manner much more instructive to the popular eye than those reproduced in this report, and there might have been introduced with advantage two or three illustrations of those curiously shifted monuments, of which striking photographs are shown in the Library of the Survey, from which this report is distributed.

LIBRARY OF THE UNITED STATES GEOLOGICAL SURVEY.—This Library is unique among libraries. Young as it is, it surely deserves mention here when its fame has reached even to the great book-mart of the world, and it is in 1889 spoken of in the Leipzig *Centralblatt für Bibliothekswesen* as “Eine bedeutende Fachbibliothek.”\* It is not a Library simply, but it is also a

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\* Eine bedeutende Fachbibliothek ist die National Geological Survey Library in Washington. Sie wurde 1881 begründet und umfasst jetzt bereits 25,000 Bände und über 40,000 Broschüren. Der Zettelcatalog nach Autoren ist beendet; augenblicklich sind in Vorbereitung eine Bibliographie der nordamerikanischen Geologie und eine solche der officiellen geologischen Berichte der Union und der Einzelstaaten. Den werthvollsten Bestandtheil der Bibliothek bildet die Kartensammlung, die etwa 20,000 Karten enthält. Die Bibliothek ist in vorzüglicher Weise untergebracht.—*Centralblatt für Bibliothekswesen*. Leipzig, 1889, April.

“An important special library is the National Geological Survey Library in Washington. It was founded in 1881 (*i. e.*, 1882), and contains already 25,000 volumes and over 40,000 pamphlets. The card-catalogue of authors is complete; in immediate preparation are a bibliography of North American geology and one of the

book-store where books are sold and shipped to every part of the globe, and an exchange office with correspondents, as widely scattered as those of the Smithsonian Institution. These two lines of work are foreign to the library work proper, and take from such work much time, but in this case the Librarian has made them to minister to the success of the Library.

To speak more in detail, this Library has first, a Publication or Document Division, which is the custodian of everything published by the Survey, and during the seven years of its existence has borne the responsibility for 270,000 volumes of the value of over \$244,000. It distributes these by sale, and renders an account therefor through sixty-eight ledgers, by exchange with scientific institutions and individuals, and reaching thus into every quarter of the world, makes all nations tributary to the library. The number of volumes handled last year was 46,837.

It has, second, a Correspondence Division, which attends to all letters relating to these publications, and received and sent out last year 30,627 letters. All this work is done by few people by means of a system elaborated by the Librarian, which is almost perfect for its purposes, and from which almost any one who handles books can take away more than one new idea.

But it is only the third division, the Library proper, that is to be considered here.

The Library grew out of the needs of the geologists and the geographers of the Survey for working tools.

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official geological reports of the Union and of the States thereof. The most valuable element of the Library is the collection of maps, which contains about 20,000 charts. The Library is lodged in an excellent manner."

The ablest geologist, the best geographer, can only maintain his place in the foremost rank by keeping himself in constant touch with current geologic and geographic literature. He can only keep abreast of his science by having ready and prompt access to the publications of institutions of learning and science, and of scientific men all over the world. In this current geologic literature the Library is especially rich.

The student needs no general scientific library, but only such books, periodicals, pamphlets and maps as relate specially to geology, or are useful in the prosecution of the work of the Survey ; but certain books and periodicals of a general scientific character, including in connection with other papers contributions to geology and geography, he must have. With this current literature of general sciences the Library is fairly supplied.

The geologist must have ready access to all those standard treatises and manuals which contain the accepted principles of geology, those classic and invaluable books, which form the canon-law of geologic science. These and other books, which are of use to the investigator of special subjects, greatly increase the value of his work. One great chapter of the Library is made up of this class of publications.

In these days of special study many very important treatises are published privately, or in small editions, and in paper covers ; and the cream of almost any scientific subject is found in this ephemeral form, so soon to disappear, so hard to procure. The Library possesses a remarkable collection of this pamphlet literature, and in its manner of handling them seems to have solved the problem that has vexed librarians so long.

The work of the Survey covers the whole country and its geologists must know everything that has been done in the localities wherein they are employed. They must have at their command all those reports upon the geology of the country made by the expeditions of the United States, or by the States themselves, all those memoirs by unattached and unofficial geologists; and for comparison, the official geological reports of other countries. The collection of these official geological reports of all the earth is very complete, and the collection of those which relate to the United States is believed to be the finest in existence.

Developing the Library along these lines and rigidly excluding everything not germane to survey work, it has come to contain six well rounded groups of publications: (1) the transactions of scientific societies and scientific periodicals; (2) standard treatises geologic, paleontologic, and mineralogic; (3) official and local geologic reports; (4) those books which assist in map making, viz., mathematics, surveying, topography, geography; (5) the pamphlet literature on these subjects; and (6) maps.

The phenomenal development of this Library, but eight years old, and its approved practical utility are the results of a wise system of library economy conscientiously applied. When Mr. Charles Darwin, an accomplished gentleman and scholar, was persuaded in 1882 to leave the Library of Congress and undertake the task of making from the beginning a special scientific library, he had indeed no books to make it of, but he also had no snarls to untangle, no bad work to undo, no conservative traditions to combat. He could choose the best

methods of modern library science, and adapt them as seemed to him best in the formation and management of a library purely special, and, therefore, needing a special treatment. The Director of the Survey, who displays rare sagacity in selecting his assistants, gave a hearty and sympathetic approval to all new plans that promised well, and in this free and progressive atmosphere have been born several ideas in library economy which have settled long and vexed questions in a very satisfactory way.

Thus with carefully considered but rapid steps, the Library has advanced toward its aim of special usefulness. And yet a few of those steps have been strides.

The first one was a great stride. In 1882, soon after his appointment as Librarian, Mr. Darwin visited Cincinnati, and succeeded in obtaining from Mr. Robert Clarke the whole geological portion of his fine private library. That eminent bookseller (who, by the way, conducts a bookstore as if it were a library, and in a way that would increase the usefulness of most libraries) had been collecting for so many years, that this purchase brought the Geological Survey a remarkably complete series of the State geological reports, including those early and rare ones now so difficult to find.

To this nucleus was now and then added an additional treasure ; but it was not until five years afterward that Mr. Charles H. Hitchcock, pleased with the Library and its conduct, consented to part with the very rarest of his collection, and made this branch of the Library practically complete.

Another stride was taken after the death of Dr. F. V. Hayden, when his widow sent to the Library his scientific

books, and desired the selection of all not already acquired. Although no book not needed was kept, and very valuable donations were turned over to the Academy of Natural Sciences of Philadelphia and to Oberlin College, there yet remained to the Library a considerable addition to its collection of general geology and scientific transactions.

In 1888 the library of M. Jules Desnoyers, a noted French geologist, for a long time librarian of the "Musée d'histoire naturelle," was sold at auction in Paris. It was of unusual richness in early European geology and especially in rare brochures.

Mr. Darwin entrusted his commissions to his assistant, Mr. Charles A. Burnett, who personally attended the sale, and at ridiculously low cost secured practically everything offered in the line of geology. This purchase comprised over 700 volumes and about 2,000 pamphlets on local geology, mineralogy and paleontology, artesian wells, coal, earthquakes, glaciers and volcanoes.

In 1889, Miss Francis Lea divided a large portion of Dr. Isaac Lea's scientific library between the National Museum and the Geological Survey, and Dr. W. H. Dall, acting for her, allotted to the Survey 576 books and pamphlets. In this year also the question of irrigation delegated to the Survey created a demand for the standard works upon the subject. These were not only not to be found in Washington, but could not be had in this country. The legitimate scope of the Library was enlarged to include not only works upon irrigation proper, but also the ministering subjects of meteorology, hydraulics and engineering. The most important works



on these subjects have so far been produced in foreign countries, and during the last half of the year there was secured from England, France, Spain, Germany, Italy and India a valuable collection of works, which will be of very material service to the topographer, the engineer, and the economist, in the study of irrigation.

The Library now contains 27,515 books (of which 19,243 were obtained by exchange, 8,272 by purchase) 37,957 pamphlets (of which 33,580 were obtained by exchange, 4,377 by purchase), in all 64,472 books and pamphlets. Its map cases are filled with *twenty thousand* topographic and geologic maps, classified geographically and indexed and numbered. The map-room will yet permit of limited growth, the pamphlet cases in the pamphlet room are sufficient for some time to come, but the document rooms are overcrowded, and the Library has overflowed into rooms in the basement and upon the second floor, and fourth and fifth floors of the Survey building until the difficulties of its administration are doubled. No confusion has been allowed to result from this condition; and the current work has been kept well in hand, but, more than any other part of the Survey, the Library needs a permanent and fitting home, with less public rooms for study,

For one aim in completing the Library from its American side is to make possible here the preparation of a Bibliography, or Bibliographies, of North American geology. Bibliographies of special topics will be here made by the specialists of the Survey; of these, one, that of paleo-botany by L. F. Ward, is about complete. A general bibliography of North American geology is preparing under the eyes of the Librarian, and although

this cannot be published for some years, it is probable that that part of it which embraces the official geological reports of the States and of the United States can be issued separately within a twelvemonth.

BOARD ON GEOGRAPHIC NAMES.—The United States Board on Geographic Names, heretofore acting by authority of the heads of the several executive departments represented, has been formally constituted and consolidated by the following executive order :

As it is desirable that uniform usage in regard to geographic nomenclature and orthography obtain throughout the Executive Departments of the Government, and particularly upon the maps and charts issued by the various Departments and Bureaus, I hereby constitute a Board on Geographic Names, and designate the following persons, who have heretofore co-operated for a similar purpose under the authority of the several Departments, Bureaus and institutions with which they are connected, as members of said Board: Prof. Thomas C. Mendenhall, U. S. Coast and Geodetic Survey, chairman; Andrew H. Allen, Department of State; Capt. Henry L. Howison (U. S. Navy), Lighthouse Board, Treasury Department; Capt. Thomas Turtle, Engineer Corps, War Department; Lieut. Richardson Clover (U. S. Navy), Hydrographic Office, Navy Department; Pier-son H. Bristow, Post Office Department; Otis T. Mason, Smithsonian Institution; Herbert G. Ogden, U. S. Coast and Geodetic Survey; Henry Gannett, U. S. Geological Survey; and Marcus Baker, U. S. Geological Survey.

To this Board shall be referred all unsettled questions concerning geographic names, which arise in the Ex-

ecutive Departments, and the decisions of the Board are to be accepted by these Departments as the standard authority in such matters.

Department officers are instructed to afford such assistance as may be proper to carry on the work of this Board.

The members of this Board shall serve without additional compensation, and its organization shall entail no expense on the Government.

BENJ. HARRISON.

EXECUTIVE MANSION, September 4, 1890.

Lieut. Richardson Clover, U. S. N., of the Hydrographic Office, Navy Department, has been chosen by the Board as secretary, and all official communications for the Board are to be addressed to him.

There has been no session of the Board since the last letter to the BULLETIN. The next meeting will be held in October.

COAST PILOT OF CALIFORNIA, OREGON AND WASHINGTON.—Mr. George Davidson, of the U. S. Coast and Geodetic Survey, relates some interesting facts in connection with the publication of the *Pacific Coast Pilot*, the 4th edition of which, entirely re-written, has recently appeared.

The first edition was undertaken during 1854-58. It was written wholly outside of official hours and duties, and part of it was first published in one of the daily journals of San Francisco. His earlier duties on the coast in 1850-54, in the determination of geographical positions, from Mexico to British Columbia, and in examining sites for light-houses, had somewhat familiarized Professor Davidson with the general features of

nearly every mile of the sea-board. When he had written the matter of the first edition and offered it to Superintendent Bache, the latter at first hesitated about receiving it, because he had known nothing of it officially, but finally accepted it upon Mr. Davidson's assuming the responsibility for the accuracy of the work. A second edition was called for in 1862, and a third in 1869. In these editions new material was added with as little change by re-writing as practicable. In 1880, when the Superintendent called for a fourth edition, it was found that the vast amount of new data could not be interpolated, so the work was entirely re-written, and it has grown to three or four times the size of the third edition (721 pp., 172 plates).

This volume states what is known of the Pacific Coast of the United States from the southern boundary of California to the northern boundary of Washington, embracing over 3,120 miles, including islands in Washington and the shores of Puget Sound.

Mr. Davidson has undertaken a scheme for photographing the whole sea-coast both for land-fall and for special objects.

**HYPSONOMETRY.**—The United States Coast and Geodetic Survey has recently published two contributions. (1) Heights from geodetic levelling between New Orleans, La., and Wilkerson's Landing, Mississippi River opposite Arkansas City, Ark., 1879-1881. Field-work by O. H. Tittman, Andrew Braid, J. B. Weir and J. B. Johnson. Reduction by C. A. Schott. (2) Heights from geodetic levelling between Mobile and Okolona, 1884-1887. Observations by J. B. Weir and J. E. Mc Grath. Reduction by C. A. Schott.

GATHERING OF SCIENTISTS.—The American Association for the Advancement of Science, which has just closed its annual meeting at Indianapolis, adjourned to meet in Washington next year, probably about September 1. At about the same time it has also been decided to hold the much-talked of International Geological Congress. On this account the Association for the Advancement of Science has invited the prominent scientific men of Canada and the Latin countries to the south, with a view of making it a great Pan-American event.

Professor Mendenhall, Superintendent of the Coast and Geodetic Survey, who is deeply interested in these meetings, anticipates that the occasion will bring to Washington from 1,000 to 1,500 scientists, 200 or 300 of whom will be from European countries. It will, in all probability, be one of the most important meetings of scientific men ever held on this continent.

ASTROPHOTOGRAPHIC CONGRESS.—The Naval Observatory has incorporated with its volume of "Washington Observations," an appendix, containing Lieutenant Winterhalter's account of Proceedings of the International-Astrophotographic Congress held in Paris, in 1887. The Congress was composed of fifty-eight members, representing sixteen different nationalities. The delegates from the United States were Lieut. A. G. Winterhalter, of the U. S. Naval Observatory, W. L. Elkin, of the Astronomical Observatory of Yale College, and the late C. H. F. Peters, of the Litchfield Observatory, Hamilton College. The latter gentleman represented also the American Academy of Arts and Sciences.

The object of this gathering of eminent astronomers

was to lay the foundation for the construction of a chart of the heavens by photography. The character of the instruments to be used was determined, and many other matters to enable an observer in any part of the world to engage in the undertaking with a correct understanding of what the others were doing, so that he could make his work correspond with theirs. The heavens will be divided into zones, beginning with the north pole. Each zone or section will be five or ten degrees in width, and it will be assigned to some observatory in convenient latitude. There is a chain of observatories in this stellar confederation, that will cover every inch of the sky, both in the northern and southern hemispheres.

One of the results hoped for, from the proposed photographic charting of the sky, is the relief of practical astronomers from much of the most wearying drudgery of their work. The stars are catalogued now by the most patient toil. Of course the photographs will not do away with all necessity of observations in the usual manner, but they will greatly assist the astronomer. Another advantage claimed for photography is, that the element of "personal error" is almost wholly eliminated from the operation. The correctness of the record will not depend on the accuracy of the eye and hand of the observer.

In connection with Lieutenant Winterhalter's mission to this Congress he was commissioned also to visit the observatories of Europe, taking cognizance of modern improvements and bearing in mind the necessities of the new Naval Observatory, now in process of erection. The results of his investigations are now published in connection with the Proceedings of the Astrophotographic



Congress, in a quarto volume, in which he details the history, personnel, construction and instruments of upwards of fifty of the European observatories. The volume contains also views and plans of prominent observatories and instruments in use.

AMERICAN FORESTS.—At a recent meeting in Berlin of the Geographical Society, Chief Forest Master Kessler called attention to the waste of timber in the United States. Among other details Mr. Kessler spoke of the destruction of forests in the United States during recent years. Quoting from the tenth census, he stated that in 1880 the 25,708 saw-mills then in operation converted \$120,000,000 worth of raw timber stock into various kinds of lumber, and he asserted that, at the same rate, there would be no good-sized timber left in forty years. He spoke of the enormous waste of wood by forest fires, which are the result for the most part of carelessness or a desire to clear land for cultivation, and declared that the planting of new forests, which has received some attention in the Eastern States, cannot begin to offset the waste. He said that there was reason to fear that America will soon be impoverished for tree property. Mr. Kessler made the striking comparison that while the United States had but eleven per cent. of its area covered by forests, the empire of Germany has twenty six per cent. of its entire area so covered. He said that the reckless destruction of trees in America and the indifference of Americans to the restoration of forests is a menace, not alone to the wealth of the nation, but to climatic conditions and the fertility of the soil.\*

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\* Communicated by Consul H. F. Merritt to the Dept. of State.





RIO DE JANEIRO FROM THE ISLAND OF COBRAS.

BULLETIN  
OF THE  
AMERICAN GEOGRAPHICAL SOCIETY.

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THE CONDITIONS AND PROSPECTS OF  
BRAZIL.

BY THE REV. G. W. CHAMBERLAIN,  
OF S. PAULO.

Arnold Guyot, in his book, "The Earth and Man," in the spirit of a devout philosopher, calls our attention to the fact that the contour and relief of the continents of the earth, the shape of the dry land, is a divine prophecy of the development of the human race; and he laments that the word *geography*, in its limited and restricted sense, does not express the truth, and that the word *geology* was not at his service to express the science of the earth.

In a word, physical geography, calling our attention to the handwriting of the Creator in the material earth, forecasts the drama of humanity to be enacted on it. But what has all this to do with the subject, *The conditions and Prospects of Brazil?* Much every way, since it determines that that land shall be :

1. One and indivisible.
2. A healthy habitation.

3. A theatre for the congregating the families of the earth.

Any atlas of physical geography will show that Brazil is separated, as it were, from the rest of South America. See that great belt of green indicating the two great hydrographical systems, which surround Brazil as with broad arms, and consider that the slightest depression of the earth's surface would have left Brazil an island. It is said that in the rainy season you can pass from the headwaters of the confluent of the Amazon to the headwaters of the river La Plata in a Rob-Roy canoe. Consider the rivers, and you will have a foreordained answer to the surmise which has been raised in correspondence about Brazil, as to whether it can maintain its unity ; as to whether Brazil will ever be divided into one, two or three nations. Its topography and configuration have predetermined the question. There is no chance for a division. You will see this by the way the waters run north and south from the vast water-shed, which embraces the region between  $15^{\circ}$  and  $20^{\circ}$  south latitude. Divide the country if you can. You cannot. No more than ours was to be divided. Secession was a rebellion against civil government not only, but it was a rebellion against divine law written on the earth, and therefore impossible. Brazil, by eternal determination, is to be one and undivided.

But is it habitable? The question, "Is Brazil healthy, a healthy place for living?" arises, because it is a region of the earth of which we possess a very limited knowledge, acquired through our trade at the shipping ports merely ; so that the information we have received of the healthfulness of some of those ports

has given us the impression we have of all Brazil; as though New Orleans were to be considered a type of the healthfulness of the United States.

Study the map, and you will realize that there is there prepared an immense theatre for the development of the drama of human life, since He, whose hands formed the dry land, has pushed up Brazil high towards heaven, so that even in the inter-tropical regions it is a "habitable part of the earth."

Physical geographers call our attention to yet another very significant fact. They tell us that the Old hemisphere, by the contour of it, foreordained the *separation* of the human family, the division and scattering of the families of the earth, whereas the New hemisphere tends to the *congregation*, the gathering together of the peoples. What they discover written upon the face of the earth, we perceive in the history of the last century, rapidly advancing in our country; so that from every quarter of the earth they are coming in and fulfilling the eternal purpose, written upon the very physical geography of our land. It is in vain for our legislators to close the "Golden Gate" against the Asiatic, or Castle Garden against the European. Just as surely as water seeks its own level, so the peoples inevitably seek our land, and they will come. There is no wisdom in Congress, or in any body of men, to bring about a law which shall defeat the eternal law. Come they will, and it were better that we adjust our shoulders to the burden of receiving them in the spirit of the precept: "Freely ye have received, freely give." The blessings of our civilization and liberty belong to the nations of the earth; let us see to it that these nations



shall have part in the blessings, which have been given to us as a precious legacy.

A similar theatre has been prepared on the southern half of this continent, in what we now know as the United States of Brazil. Vast area, healthfulness, and indivisibility, all point to a congregation of the families of man and a vast development in the near future.

It is remarkable that, just as we are fearing that we are having a little too much, a little more than we can adjust, of this immense tide of human life, Brazil, which has been reserved for such a time as this, is thrown open, and is stretching out her arms to all the nations of the earth, and asking for labor to develop her resources.

In the year 1500 a Portuguese fleet, meaning to double the Cape of Good Hope on the way to their East India possessions, was deflected against the coast of South America. Cabral announced that he had discovered something, and took possession in the name of Portugal; and in the name of the King of Heaven, erecting a cross upon this new shore, called it the "Land of the Holy Cross." Is it not a marvel that the little nation on the extreme western coast of Europe should be able to hold four thousand miles of Atlantic coast against all comers? If you will look back over old maps of the 16th Century, you will see that France thought that she possessed a large portion of South America, and went so far as to name it Antarctic France. Later, the Dutch, in the 17th Century, possessed themselves of the northern coast of Brazil, and for a period of thirty years held it with strong forts. You will find their forts still in the cities of Pernambuco

and Bahia. The descendants of the Portuguese are in possession, but neither the French nor the Dutch remain. Either of these nations was stronger than Portugal, yet it was given to that little nation to possess this vast dominion. Why? In order that it should lie for a time in the hands of a nation which would with a jealous spirit seal it up hermetically, and hold it closed to commerce. Portugal not only possessed, but possessed exclusively, all Brazil, and excluded from trading at its ports all ships not coming from her own. In the present century, that scourge of Europe, Napoleon, threatened to swallow up Portugal. Her king fled from his European to his American dominions, and the court of Portugal was established in Brazil. Then, when other reasons prevailed, Dom John returned to Europe, leaving his son with the title of Regent. Already the spirit of Republicanism was abroad, and the wise old king perceived that there would be, and perhaps very soon, a development of the spirit which would wrest from Portugal that dominion. It is said that he gave secret instructions to his son to anticipate such a movement by breaking off Brazil from the old *régime*, while securing it to the dynasty of Portugal. Dom Pedro was the first to draw his sword, and exclaim "Independence." Thus Brazil became independent of Portugal with scarcely more bloodshed than now, when she passes from an Empire to a Republic without a single combat.

The spirit which was then prevalent among Brazilians demanded larger liberties. It was a time of great restriction in Portugal of expression of sentiment, and measures were adopted which expelled some of the most liberal minds. Many students of the law school

of Coimbra, the University of Portugal, came over as exiles to Brazil, and settled in the Province of Minas-Geraes. There were poets among them, men in whom poetic fire was burning brightly, and so these knights of the pen formed a fellowship in suffering and aspiration with those of the sword. At length one of their number, Silva Xavier, drew his sword, just one century ago this year, in 1789, with a cry for the Republic. He was one century in advance of God's time, and as a result he was hung, drawn and quartered. But the spirit of the man lived, and has been marching on in Brazilian history from that day to this. It obliged the first emperor to abdicate in favor of larger liberties of the people, in favor of the participation of the patriots in the government of the country. That abdication left a child, five years and four months old, Emperor of Brazil.

A very wonderful history is this of Dom Pedro the Second, who never saw his father from that time. Dom Pedro I. had wisdom and sagacity enough to confide this child to the care of the man, who had really forced the issue with him, recognizing in him a disinterested and devoted lover of his country. Jose Bonifacio De Andrada, "the Benjamin Franklin of Brazil," gave to the child's mind its bent, and led it out in love of truth, awakening in him a taste for study which has never abandoned him. Thus there was prepared an instrument, who should become a nursing father to the liberties of the people. The expressions which have been attributed to Dom Pedro since he landed in Europe, when urged by his son-in-law to abdicate in favor of his daughter, that they might use force of arms to bring

back the dominions to the crown, show that there is burning in his heart the same love of his country, the same appreciation of the liberties of the people, which he received in early childhood from his tutor.

This providence in the government of the land secured a quiet of nearly half a century, in which the seeds of civil government were growing and ripening in the hearts of the people. This must be taken into account if we would understand the late developments in Brazil, which are destined to change radically and rapidly its future. Before we touch upon the flitting and fleeting shadows of political geography, let us consider the physical conditions of the people who possess the land. When the Portuguese first discovered the land to which the fleet was driven by the wind, they found the Indian. It is estimated that we still have a million of Indians in Brazil. It is a mere estimate. We have no means of ascertaining the exact truth, for, indeed, a vast part of the territory has never been explored. Only last year (1888) German explorers going up a confluent of the Amazon River, the Xingú, found tribes of Indians of which there had never been notice even; not nomadic, but agricultural in their habits. It has been said that the Indians of Brazil are inferior in some respects to those of North America. Yet they have the same qualities, physically. They show the same strong sense, the same keen perception of truth and justice, which has been revealed frequently in the "poor Indian" of our own country. It is narrated of one of these sons of the forest that on one occasion, when regarding an image, carved from the trunk of an orange tree on the plantation where he was domesticated, he stood

alone while others bowed in the presence of this image, and, when ordered to kneel, replied: "No! I knew him when he was an orange tree."

This native capacity of the Indian is displayed in his handiwork also. Two years ago, from the province of Paraná, a friend sent to Dr. Cornelius R. Agnew, of this city, a kind of blanket woven from the *urtiga* (wild nettle), which is a product of the forests of Brazil. It was marked by the regularity of machine work, yet the preparation and weaving of the threads was done entirely by hand, woven thread by thread, with wonderful skill. It was not a blanket to shield from the cold, but from the wet; and was almost impervious to rain.

Take hold of the bows, which demand gigantic strength to stretch them, or look at the wonderfully prepared arrows of these Indians, six feet in length, composed one-half of wood and the other half of bamboo, feathered, and pointed with some sharp point prepared from the bones of birds and animals, and recognize the same wonderful skill. Those who have lived among the Indians of Brazil tell of the precision with which they shoot their arrows. Calculating the parabola of the curve, they fire the arrow into the air so that it falls upon the only tender spot in the shell of the turtle, and pins him to the ground. Here is a power of calculation and estimation of forces that is scarcely exceeded by the most expert artilleryman. When, in the dense forests, they attempt to shoot a bird perched in some of the gigantic trees and miss their mark and the arrow disappears in the air, they wait attentively to hear its fall; if the ear fails to tell where that arrow is, they draw a second which passes through the branches in the





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identical spot, and those two arrows will be found together. These arrows cost them great labor, and are too valuable to be lost. The intelligence of these people, manifested in this cultivation of the hand, eye, and ear, reveals an element in the aboriginal population of Brazil, which demands our attention, and gives assurance that it will be rewarded with great developments, under wise direction.

General Couto de Magalhães, recently President of the province of S. Paulo, after graduating at the law school of S. Paulo, passed eight years of his life, fishing and hunting with the Indians. He afterwards prepared a grammar of their language and wrote a book entitled, “O Selvagem do Brazil”; and has engaged in various efforts to bring them under the power of civilization. In all his journeys among the Indians from Pará on the north to Paraná on the south (for he has repeatedly crossed the continent), he has not found any community which he could call Christianized.

Let us turn to another element of the population of Brazil. The slave trade brought into Brazil a vast element of labor, and we have now at least two millions of freedmen. They are from various tribes on the west coast of Africa. There is one tribe, the Mina, Mohammeden in religion, which has maintained its tribal relations even in slavery. They may be seen on the streets of Bahia and Rio de Janeiro, laying down their burdens and kissing the hand of a fellow slave, recognizing his rank as prince, or priest. A few years ago an old grey-haired black stopped in front of the show-window of the British and Foreign Bible Society's store, to gaze upon an Arabic Bible. He entered and inquired

for the holy book. When the agent showed him the Bible, he turned its pages and said, "No, that is not the book." He wanted the Koran. He could not be induced to take a copy of the Scriptures. A few days after he returned and asked how many such copies existed in that depository, and purchased all they had. (Rio de Janeiro has become a sort of highway of the nations, so that the Bible in many tongues is kept to anticipate any demand, that might arise from ships passing there from the ends of the earth.) This slave had been liberated by the common purse (for his tribe maintained a common purse), and was about to return to Africa. He was a priest of that tribe. Their masters never found it profitable to endeavor to keep them in abject slavery, and have given them considerable liberty, each one paying daily a certain quota to his master. Among the merchants of Brazil are blacks of this tribe, who have acquired wealth. Many other tribes, of less intelligence and energy, who have borne the burden and heat of the day in developing the agricultural and mineral resources of the Empire, are now a component part of the population of Brazil. This points to another of the social problems, which confront the statesmen of the new Republic.

Turn now from these inferior races of Indians and negroes to the ten millions of the dominant race. The original stock is Portuguese. In habit, customs, style of dress, manner of living in the homes which they have made for themselves, they resemble the people of Southern Europe. The Portuguese mingled their blood with the Indians, and we have *mestiço*; they

mingled their blood with the negro, and we have the mulattoes. Those ten millions are by no means therefore all pure blooded Portuguese. While a small per cent. of them are pure Portuguese, Portuguese customs obtain among them in the whole country, and the Portuguese tongue is the language of the country. Spanish is spoken in all the rest of South America, except in Guiana. While Spain possessed the Western coast, there fell to Portugal most of the remaining territory, equal to one-fifteenth part of the whole earth, one-fifth of the New World, or three-sevenths of South America. These, in brief, are the physical conditions.

What are the intellectual? The schoolmaster was abroad in Brazil very early. No sooner did Portugal possess the land than her first shipment of colonists was accompanied by tutors. There was a school in the province of S. Paulo as early as 1554. Around the little hut, in which that school began on the 25th day of January, 1554, there grew up a city. It has now 50,000 inhabitants. There also grew up vast establishments, monasteries. While Brazil was still a colony, the Marquis of Pombal expelled from the Portuguese dominions the Jesuits. Some of their buildings were appropriated to schools of quite another character under the civil government. We have there the oldest law school on this Western hemisphere. This affords the nearest approach to a university education, which Brazil has given to her youth. Some years ago, a young Brazilian, graduated from the law school in S. Paulo, came to the city of New York and established a paper, *O Novo Mundo*, for circulation in his own country. He was well known as a member of the Univer-

sity Club. Lawyers in this city said of him that he knew more law than lawyers brought up in our own country are expected to know, before they have been ten years, at least, in practice. The course of law at S. Paulo is five years, and there is a preparatory course, in which every candidate for the law course is expected to pass an examination in at least eleven studies. He must be prepared to consult Blackstone in English, and other works of law in French, for the course embraces the wide international department. These preparatory and law schools bring together in that centre young men, from the Amazon to the river La Plata, for a period of at least five years of their lives. Through this and similar schools in Pernambuco, Bahia and Rio de Janeiro, Brazil has disciplined largely the mind of her educated classes, and some of the marvellous fruits of this discipline you have seen in the peaceful Revolution of November 15, 1889. This may explain how it is that men could have so prepared a nation as to pass from one form of civil government to another, with scarcely any more agitation than the passing of night into day.

Brazil has also her medical schools. Any man who carries his certificate from New York, Edinburgh, or elsewhere, is not admitted to practice in Brazil until after he has sustained theses before either the Faculty of Bahia, or that of Rio de Janeiro. She has also her Polytechnic School, which is comparatively new. The present Minister of War was at the head of such a school in the city of Rio de Janeiro. She has public schools, very inefficient, it is true, owing in part to the sparseness of the population, and the great difficulties

to be overcome in the indisposition of the people to learn. In parts they have established obligatory education, and, where the population is within a certain radius of the schoolmaster, the inhabitants are obliged to send their sons and daughters to school. Because of the inefficiency of the public school system, recently, there have been great efforts to establish normal schools. Unfortunately for these schools, they have been placed in the hands of men, who have derived their ideas of education largely from books. Those who graduate from them walk on stilts over the heads of their pupils. It is evident that the people are reaching out after a better system of education. In 1884 there was held in the city of Rio de Janeiro an Exposition, to which other countries were asked to contribute, to enable the Brazilians to gain a clear idea of education in all its branches. That Exposition became permanent, and the articles which were contributed by other lands became a useful object-lesson to the teachers who visit the Capital.

Turning now from these elements in the social condition of Brazil, let us look for a moment to the new condition, involved in the change of the form of government. It was first announced to us as a *coup d'état* of arms. It excited the greatest astonishment, that a handful of soldiers should be able to carry the Empire, and effect so radical a change in a single day. How shall we account for it? Remember the sword which Silva Xavier (Tiradentes) drew in 1789, and for which he was slain a century ago. Consider that that sword has been beaten not into pruning-hooks, but into pens. Throughout the century, from that day to this, there



has not lacked a man to write in defense of the idea, for which he gave his life. This has been doubly so in the last quarter of a century. Quintino Bocayuva, now the Minister of Foreign Affairs, in the new Republic, co-editor in 1870 of the paper entitled *A República*, advocated openly in the city of Rio de Janeiro principles of republicanism. He has continued to write from that time with a pen, which has merited for him a title such as was given to Chrysostom. It has been a golden pen, a pen of moderation, of firmness, of consistency, and it has scarcely ceased, day or night, to scatter the seeds of free government on the wings of the press. When it was found that the paper, *A República*, could not yet be sustained, the Republicans wisely dropped it, but continued to advocate their principles through the daily papers of the country. Many of the young students of the law school and medical schools have been associated with them in this service ever since. It was evident to those of us, who were in Brazil in September, 1888, that their principles were already prevalent, and would soon become dominant. When the Deputy, elected from the very Province of Minas where "Tiradentes" was slain in 1789, presented himself as the choice of his fellow citizens for his seat in the parliament as a Republican, and openly declared his unwillingness to take the oath of allegiance to the monarchical government, or to support the religion of the state in which he was not a believer, he was required to retire. The House resolved itself into a Committee of the Whole, and Conservatives and Liberals vied with each other in maintaining that that man was just as much entitled to his seat in the House as any of them. One of the Con-

servatives maintained that he was more entitled to his seat than some of them, saying, "He appears to have more conscience than the most of us." The deputy was admitted to his seat. It was evident, therefore, that the principles, which had been advocated by Republicans, animated both the Liberals and Conservatives, and there was no appearance of resistance, and no disposition to resist them. Later, when the Conservatives were unable to command a majority in that wary House, and the Emperor dissolved it and called a Liberal to form the Ministry, and that Ministry on the 7th of June last took its seat, there were cries on the part of some of the members of the House of "Down with the Monarchy," "Long live the Republic." Therefore, the movement has not taken by surprise those who have been watching the current of affairs in Brazil, except in this, that it was not anticipated so soon. It was not in the spirit of the people to displace the old monarch, who had endeared himself to them by many of his traits of character, nor was it the popular desire that he should be disturbed in his lifetime. It was feared that his political life would be cut short by his leaving or abdicating his throne in favor of his daughter. This fear led to such a combination among the leaders of the parties, and the army and navy leavened with republican principles, that there was no resistance in any quarter to a quiet passage from one form of government to another.

I am persuaded that Dom. Pedro is better satisfied himself to see his principles prevail under a Republican form, than to see them go down under his own dynasty. What are the prospects? Who can be a prophet?

There are many who prophesy the fall of the new government, who hold that it will certainly go to pieces. On the contrary, I am persuaded that it possesses the elements of permanency. The Provisional Government is composed of men of undoubted patriotism and ability. At the voice of the people they will yield their places peacefully to better men, if there are any. The man who was called into the presence of the Emperor on that eventful night (15th November) to organize a new Liberal ministry (Senator Saraiva), who had just arrived from a visit to Europe, has been looked upon for the last thirty years as the foremost man of the Liberal party, a man of counsel, prudence and moderation. If his life is spared, he will undoubtedly be promoted to the chief position in his country. But should he not be? Are there no other men capable of taking his place? One of the foremost Liberals in the province of S. Paulo said to me last January: "We have been like boys grown up in their father's house—the old gentleman always governing and guiding everything and putting no responsibility upon us, and now that he is become through age and disease unfit to govern, there is no one of us who knows just how to take hold of the helm, and steer the good ship." "That," he said, "is the condition of all parties." It does not imply, however, that there is no latent ability. I think we have seen it manifested that there is wonderful ability, and, put into play, it will develop itself marvellously. We have an eminent example in Ruy Barboza, the present Minister of Finance. The only thing to be feared for him is that his small body will not be able to carry his great head. Nothing worthy of note on the

principles of free government, whether published in this country, or in England, has escaped his attention. When in Parliament, he distinguished himself as the advocate of equal rights and religious liberty for all his fellow citizens. He applied himself during his absence from Parliament to the preparation of school books. He prepared the most rudimentary works for his people, thus employing his enforced leisure. That is the character of the Minister of Finance. There will not be wanting a man, while Ruy Barboza lives, to steer the ship of State. He is inspiring wise measures for the consolidation of Republican principles. The voting population of Brazil is a very small minority of the whole, and the provision, which limits the power of voting to those who can read and write, is designed also to stimulate education.

In an article but lately published the remark was made that the Emperor Dom Pedro had said that if he were not Emperor he would be a school teacher, for he considered the guiding of the mind and preparation of the character as the noblest mission on earth. It was remarked that, while it may be doubted now that, having ceased to be Emperor, he will become a school teacher, yet there is no doubt that the future of Brazil is in the hand of the school teacher.

In the closing chapter of "A Journey to Brazil," Professor Agassiz has set forth clearly his hopes for that land, where he had exceptional opportunities for observation. He saw three obstacles to progress—slavery, a corrupt clergy, and lack of educational institutions.

Slavery is a thing of the past. Religious liberty will

bring into play forces, which will require "a more vigorous, intelligent and laborious clergy." Education has received a great stimulus. We are drawing nearer to the realization of the brighter hopes entertained by the great naturalist, who thus expressed himself: "There is much that is discouraging in the aspect of Brazil, even for those who hope and believe, as I do, that she has before her an honorable and powerful career. There is much also that is very cheering, that leads me to believe that her life as a nation will not belie her great gifts as a country. Should her moral and intellectual endowments grow into harmony with her wonderful natural beauty and wealth, the world will not have seen a fairer land."

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NOTE.—Chief among these natural wonders is the Paulo Affonso Fall of the S. Francisco River, 150 miles above its mouth. This Fall is described by Burton, in his "Explorations of the Highlands of the Brazil."

"The Quebrada, or gorge," he says, "is here 260 feet deep, and in the narrowest part it is choked to a minimum breadth of fifty-one feet. It is filled with what seems not water, but the froth of milk, a dashing and dazzling, a whirling and churning surfaceless mass, which gives a wondrous study of fluid in motion. . . . Here the luminous whiteness of the chaotic foam-crests, hurled in billows and breakers against the blackness of the rock, is burst into flakes and spray, that leap half-way up the immuring trough. There the surface-reflections dull the dazzling crystal to a thick opaque yellow, and there the shelter of some spur causes a momentary start and recoil to the column which, at once gathering strength, bounds and springs onward with a new crush and another roar.

"The heaped-up centre shows fugitive ovals and progressive circles of a yet more sparkling, glittering, dazzling light, divided by points of comparative repose, like the nodal lines of waves. They struggle and jostle, start asunder, and interlace as they dash with steadfast purpose adown the inclined plane. Now a fierce blast hunts away the thin spray drift, and puffs it to leeward in rounded clouds, thus enhancing the brilliancy of the gorge-sole. Then the steam boils over and canopies the tremendous scene. Then in the stilly air of dull warm grey, the mists surge up, deepening still more, by their veil of ever ascending vapor, the dizzy fall that yawns under our feet.

"The general effect of the picture—and the same may be said of all great cataracts—is the 'realized' idea of power, of power tremendous, inexorable, irresistible. The eye is spell-bound by the contrast of this impetuous motion, this wrathful maddened haste to escape, with the frail steadfastness of the bits of rainbow, hovering above; with the "Table Rock" so solid to the tread, and with the placid, settled stillness of the plain and the hillocks, whose eternal homes seem to lie here."

Further on, he writes: "We have also here the greatest possible diversity of falling water; it consists, in fact, of a succession of rapids and cauldrons, and a mighty Fall ending in the Mai da Cachoeira, upon whose terrible tangle of foam we have just looked down. If Niagara be the monarch of cataracts, Paulo Affonso is assuredly a king of rapids; an English traveller who had seen the twain, agreed with me in giving the palm to the latter, as being the more singular and picturesque of the two, which are both so wondrous and so awful."





THE PAULO AFFONSO, THE NIAGARA OF BRAZIL





## RECENT DISCOVERIES IN EGYPT.

BY

MISS AMELIA B. EDWARDS.

The paper which I had the honor of reading before the American Geographical Society on December 9, 1889, and of which I am requested to write a *résumé* for the Transactions of the Society, dealt principally with the very remarkable results obtained by Mr. W. M. Flinders Petrie in the course of his recent explorations in Upper Egypt. These results tend to show that there were colonies of European foreigners settled in Egypt at a much earlier period than has hitherto been supposed. They also prove the existence of alphabetic signs (and presumably of a system of writing) peculiar to those foreign settlers, and for the most part entirely distinct from the hieroglyphic signs by means of which the people of Ancient Egypt had, from immemorial time, recorded the deeds of their kings and the dogmas of their religion.

It is now more than a year and a half ago—in the spring, namely, of the year 1889—that Mr. Petrie, having completed his excavations at Hawâra, proceeded to explore the ruins of two small towns situate, like Hawâra, on the edge of the desert bordering the eastward limit of the Fayûm. The one mound is locally known as Tell Gurob, or “The Mound of the Raven;” the other was so little known or noticed by the natives, that only one old man remembered to have heard it

called Tell Kahûn, when he was a boy. Tell Gurob and Tell Kahûn lie about seven miles apart, on either side of the Bahr Jusûf Canal ; and Mr. Petrie took advantage of their proximity to open both at the same time.

Even before beginning the work of excavation, Mr. Petrie recognized that the ancient towns represented by these two formless heaps of crude brick and desert sand were each of a single period : *i. e.*, that having been built, and for a time inhabited, they had been suffered to fall to ruin, without any pulling down and rebuilding, such as takes place in towns inhabited by successive generations. Each site was therefore a mere surface ruin ; and, there being no accumulation of *débris*, the labor was comparatively light. The earlier site proved to belong to the remote period of the XIIth Egyptian Dynasty ; the later site to the latter half of the XVIIIth Dynasty and the first half of the XIXth. Or, to be more exact, Kahûn was found to be the town built for the accommodation of the workmen and officials employed in building the pyramid of Usertesen II., fourth Pharaoh of the XIIth Dynasty (*circa* B. C. 2800) ; this being the pyramid known as the Pyramid of Illahûn.\* The workmen probably migrated when the pyramid and funerary chapel were completed ; but the town continued to be inhabited for two or three generations by a mixed population, and was deserted about the end of the XIIth Dynasty, or the beginning of the XIIIth.

Tell Gurob, on the other hand, was founded during the reign of Thothmes III. (*circa* B. C. 1400),

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\* This pyramid was at the same time explored by Mr. Petrie, who found it to be that of Usertesen II. There is an evident connection between the names Illahûn and Kahûn, both of which may possibly echo some very ancient name.

sixth sovereign of the XVIIIth Dynasty, and became extinct about a century later, in the time of Seti II. of the XIXth Dynasty (*circa* B. C. 1290).\*









Kahun, the workmens' colony, was laid out in parallel rows of narrow streets inclosed in a rectangular boundary-wall, and it appears to have somewhat resembled the Escorial as to plan. In the ruins of the houses, a vast number of domestic objects were found, as well as old tools left behind as useless, when the town was deserted. Among these were knives, chisels, nails, mallets, adze-blades and an adze-handle, in the house of a carpenter; two or three plasterers' floats in the house of a plasterer; a wooden brick-mould and a trowel in the house of a bricklayer; a mason's plummet; a laborer's sickle and hoe, etc., etc. As in all ancient Egyptian sites, there was, of course, a great accumulation of pottery broken and unbroken, some of the larger pieces of ware being incised with a rude imitation of basket-work, extremely archaic in style, and unlike any decorative motives known in Egyptian art. The shapes of the various vessels also differed from the shapes fashioned by Egyptian potters. Some of these pots, moreover, and a large proportion of the potsherds, were found to be inscribed with alphabetic characters scratched on the surface of the ware. These were apparently owner's marks, and therefore disconnected; but on one piece of curiously shaped wood, which formed probably part of the handle of a tool, was cut a word of five letters, evidently a name *ITUEIA*.

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\* These dates are calculated according to the chronology of Manetho, as adopted by Mariette. Mr. Petrie makes them about two centuries lower.

In this group of letters, and among the letters scratched upon the pottery and potsherds, it is a very remarkable fact that some look like modified hieroglyphs, while others are identical with certain characters of the kind known as "Cadmæan"—the earliest Greek derivative of the Phœnician.

Others closely resemble various letters of the Cypriote, Græco-Asiatic, and early Italic alphabets.

In the group of which a fac-simile is given above, we have for instance in the first letter the Etruscan ; in the second, the Theran ; in the third, a character rudely resembling the Etruscan  or ; and in the fourth, a form nearly identical with the Phœnician  or . The fifth sign,  may perhaps stand for the Egyptian hieroglyph . The word spelled by these five characters is not yet satisfactorily deciphered.

Others of the signs scratched on the potsherds of Kahûn are unquestionably Cypriote, as in the following examples :

Kahûn.	Cypriote.
	
	
	
	
	
	

These are but six instances out of nearly forty parallelisms between the Kahûn and Cypriote signs.

The former are between seventy and eighty in all. Some are quite unknown; about a dozen are distinctly Egyptian; and the rest more or less resemble the alpha-

betic signs of Thera, Santorin, and Etruria. Of the "zvastika" so frequently found by Dr. Schliemann at Troy and Mycenæ, two examples are included.\*

When we remember that the town in which these inscribed potsherds have been discovered was built during the reign of Usertesen II. (and doubtless at the beginning of his reign, it being customary for a Pharaoh to commence the preparation of his tomb as soon as he ascended the throne), and that the place ceased to be inhabited, if not immediately after the completion of the pyramid, quite certainly by the time when the houses fell out of repair, the remote date to which the foregoing alphabetic signs must be attributed becomes of profound significance.

At Tell Gurob, a block sculptured with the ovals of Thothmes III. gave the earliest local date, while other objects inscribed with the names and titles of Tutankhamen, Horemheb, Rameses I., Seti I., Rameses II. and Menephtah show that the place continued to be inhabited till past the middle of the XIXth Dynasty. Here again, the houses had been left standing on the desert sand as at first erected, the upper parts of the walls having fallen in, and no attempt having been made at rebuilding. As at Kahûn, these ruined shells had become choked with rubbish, buried under the blown sand, and thus sheltered from observation and plunder. Neither site can, in fact, be accurately described as a "mound;" both being mere low-lying sand-heaps, such as might have accumulated over a natural rising ground at the edge of the desert.

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\* Cf.: The Alphabetic Tables of Thera, Phrygia, Lycia, Etruria, etc., in Maspéro's *Hist. Ancienne des Peuples de l'Orient*; also the alphabetic tables in Isaac Taylor's "*History of the Alphabet*."



A large number of domestic objects were found in the ruins of private houses at Gurob, such as combs, netting needles, children's toys, scribes' palettes, toilet vases, spindles, whorls, baskets, balls of thread, etc., etc., as well as some very fine bronze knives, chisels, axe-heads, mirrors and the like. There was also an abundance of pottery, variously shaped and decorated, and the usual heaps of miscellaneous potsherds. Here again, a large proportion of the potsherds was found to be incised with alphabetic characters. The pottery of Tell Gurob is, however, quite unlike the pottery of Kahûn, both in style and workmanship; also, the alphabetic signs scratched on the Gurob fragments are less archaic, and much more easily identified, than the alphabetic signs of Kahûn. The pottery of Gurob is partly Cypriote and partly Mycenæan in type. False-necked vases, bottles of the well-known "pilgrim" shape, and vessels decorated with concentric patterns abound; all alike foreign to the hand of the native Egyptian potter. The alphabetic forms have passed the transitional stage of the Kahûn signs. They no longer bear a doubtful resemblance to hieroglyphic characters, or to "Cadmæan" Greek. They are distinctly Cypriote, with a sprinkling of letters identical with the alphabetic forms of Thera, Melos, Lycia, Phrygia and Etruria. Of Cypriote characters, Professor Sayce has verified 51, while of Egyptian hieroglyphs, there are 6 or 8 only.

The epigraphic evidence thus far goes to prove the presence of two colonies of alien settlers on the border of the Fayûm, very near together as regards locality, but widely separate as regards date. The evidence, however, is not only epigraphic. In the cemetery of the


ancient town represented by the ruins of Gurob have been found interments of a foreign race; the bodies mummified "after the manner of the Egyptians," but with foreign names painted upon their mummy-cases, and skulls of an alien type. That they were a yellow-haired people is shown by the yellow and reddish locks yet thick upon certain of the mummied scalps. The interments are such as would be made for persons of good social position—not for captives or slaves. The coffins are painted black, with white inscriptions; and Cypriote pottery was found buried with the dead. The white ants have, unfortunately, done much damage to the mummy-cases, and but few of the inscriptions are legible. In one tomb, however, were found ten Cypriote jars and several Ushabti made for a man called



*Kash-sadi-amia*; a name distinctly Asiatic.\*

Yet more remarkable is the name found upon the coffin of one of the yellow-haired mummies, called



*An-Tursha*, or *Aniu-Tursha*, of whom it is stated in his funerary inscription, that he was governor of the palace. It is to be observed that the above name is followed by the two determinative signs  indicating a foreign country; while the name of the deceased clearly denotes that he was of the race of the "Tursha"—a nation† which first appears upon the mon-

\*"Sadi" is found in Hittite names, and it is therefore probable that *Kash-sadi-amia* was of Hittite (Khetan) descent.

† See for the identity of the "Tursha" with the Tyrseni and Etruscans, "*Les Origines de l'Histoire d'après la Bible*" by F. Lenormant, Chap. xiii. pp: 132 et

uments of Egypt in the beginning of the reign of Ramesses II., and which reappears in the fifth year of Menepthah, his successor. The "Tursha" have been identified by De Rougé and Maspéro with the Tyrsēni, or Etruscans; an identification confirmed by the late François Lenormant. That an Etruscan should have filled so important an office as that of Governor of the Palace, is very remarkable; this fact accounts, however, for the presence of Etruscan settlers in the town, as such settlers would naturally congregate under the protection of so powerful a compatriot.

Yet further evidence of foreign occupation has been discovered by Mr. Petrie at both Kahûn and Gurob, in the presence of weights differing in all respects from the weights current in ancient Egypt. Eight of these weights (all of foreign standards, or multiples of foreign standards) were found in Kahûn. One important example weighs 30 x 399 grains, which is double the 200 grain weight, less one grain only. That is to say, it is based on a multiple of 30, which is the Æginetan standard; whereas, if based on the Egyptian standard, it would be a multiple of 20 or 50. The weight is marked "thirty" in Egyptian numerals *nnn*. The earliest example of weight of the Æginetan standard previously found in Egypt was of the time of the XVIIIth Dynasty; whereas this of Kahûn is of the XIIth Dynasty.

Thirteen foreign weights were found at Tell Gurob, all based on the Assyrian shekel standard. Some of these were of hematite, and one was of lead. Only one Egyptian weight was found at Gurob, and not even one at Kahûn.

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*seq.* 2d Edition. Also, E. de Rougé in "*Les Attaques dirigées contre L'Egypte*," *Revue Archéologique*: Vol. xvi., new series.

These facts are conclusive. They prove that both sites were, at widely separate periods, occupied by foreigners, and that these strangers adhered to their national standards of metrology. It is remarkable that the Æginetan standard should prevail in the earlier settlement, and the Assyrian standard in the later; more especially as the later settlement was largely inhabited by an Etruscan colony, who might be expected to follow the Æginetan system. It was, however, in Gurob that the Asiatic named *Kash-sadi-amia* lived and died; we may therefore conclude that there was also an Asiatic (possibly a Hittite) element in the community, and that the Assyrian shekel-standard was established by Asiatic settlers.

Our knowledge of the Greeks from historical Greek sources may be said to begin with the First Olympiad. It is at this point that tradition is succeeded by history. But our knowledge of the Greeks from sources external to Hellas dates from an infinitely earlier period, and it comes to us from Egypt. In a tablet carved on the cliffs of the valley of Hammamat, which leads from Coptos to the Red Sea, there exists to this day a record of the victories of Sankhara, last king of the XIth Dynasty (*circa* B. C. 2500) in which he boasts that he has "broken down the strength of the Hanebu;"—"Hanebu," (which means "the people of all shores") being the name by which the coast-folk and islanders of the Ægæan were designated, not only at that remote time, but as recently as the reigns of the Ptolemies.\* The fact that this very ancient race-name continued in use up

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\* See *Les Origines de l'Histoire d'après la Bible* by F. Lenormant, Chap. xiii. p. 21, 2d Edition, 1884.

to a date comparatively modern (and this despite the distinctions made under the new empire between Danæans and Achæans, Lycians and Carians, etc., etc.) leaves us in no doubt as to its application. Earlier, therefore, by a century than the beginning of the reign of Usertesen II., in whose time Kahûn was built for the housing of the foreign workmen employed on the pyramid of Illahûn, we find an Egyptian king celebrating his triumph over the island tribes and coast tribes to which those workmen belonged. This is the earliest mention of the Greeks in the history of the world.

Turning next to the time of Thothmes III, we find it recorded in his famous "Chant of Victory"\* that this Pharaoh had vanquished the people of "Kefa and Asi," and those "who dwelt in their islands"—i. e., the people of Phœnicia and Cyprus, and the islanders of the Archipelago. And it is precisely during the reign of Thothmes III. that the site of Gurob is occupied by foreign settlers, some of whom inscribe their pottery with Cypriote characters, while all employ the Assyrian standard of metrology.

Take them from what point of view we may, these coincidences are very remarkable. But first and foremost stands the extraordinary fact that from the ruins of two small and insignificant hamlets, which no previous traveller had observed and which not even the neighboring Arabs had thought worth plundering, Mr. Petrie has disinterred the earliest Greek alphabetic signs yet discovered. In the characters scratched upon the pot-

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\* See "The Tablet of Thothmes III." translated into English by Dr. Birch, *Records of the Past*, Vol. II; also the French version of Mariette in his *Catalogue of the Musée de Boulaq*; ditto, Maspéro, in his *Histoire des Peuples Anciennes d'Orient*, Chap. v., p. 202.

sherds of Kahûn, rude and tentative as they are, we seem not only to detect the very beginnings of that alphabet, but to see it in the course of its development from Egyptian hieroglyphs, and possibly (as Professor Maspero has suggested) from the masons' marks employed by Egyptian workmen. These inscribed potsherds are contemporary with a period which, according to a generally received opinion, coincides with the descent of Abraham into Egypt.

The inscribed potsherds of Gurob date from a reign computed at some twelve or thirteen hundred years later; and, even so, are more than two centuries earlier than the accepted date of the Exodus.\*

When these dates are compared with the dates of the earliest specimens of Greek writing previously known—namely, the rock-cut inscriptions of Santorin and Thera, which Lenormant attributes to the 9th century, B. C., and the famous inscription cut upon the leg of one of the colossi at Abû Simbel, which is contemporary with the 47th Olympiad—the extraordinary importance of Mr. Petrie's discovery is thrown into startling relief. It carries back the history of the alphabet to a period variously computed at from 2,500 to 2,300 years before the Christian era; and it shows that the Iliad may, after all, have been committed to writing while Homer yet lived to dictate it.†

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\* The inscribed potsherds of Kahûn and Gurob are deposited in the Department of Greek antiquities in the British Museum, and are open to the inspection of all who desire to examine them.

† Since the above discourse was delivered before the American Geographical Society (on December 9, 1889), Mr. Petrie has published a full account of his discoveries, entitled "*Kahûn, Gurob and Hawâra*," to which I refer all who desire to become more fully acquainted with the subject.

A. B. E.



DEFINITIONS OF GEOGRAPHICAL NAMES,  
WITH INSTRUCTIONS FOR CORRECT  
PRONUNCIATION, FOR THE VAR-  
IOUS HIGHER SCHOOLS.

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A SUPPLEMENT TO EVERY SCHOOL GEOGRAPHY.

BY

KONRAD GANZENMÜLLER, Ph. D.

THE IBERIAN PENINSULA.\*

SPANISH: *sierra*=range of mountains, or *mountains*, *mónte*=*mountain*;—*Iago*=*Jacob*, *James*, *Andér* (for *Andrés*)=*Andrew*;—*mayór*=*greater*, *menór*=*smaller*, *serrāto*=*jagged*, or *toothed*, *nevādo*=(covered with snow), *snowy*, *maladēto* (Aragonese), or *maldito* (fem. *maldita*)=*cursed* (cursed by God), *san*, *sant*=*saint*, *holy*.

THE BALEARIC ISLANDS are distinguished after their size; MAJORCA (Sp. *Mallorca*) means THE GREATER ISLAND, and MINORCA (Sp. *Menorca*)=THE SMALLER ISLAND.—SIERRA NEVADA=SNOWY MOUNTAINS.—MONT-SERRAT=THE JAGGED MOUNTAIN (so called from its appearance);—MALADETA=THE CURSED *group of mountains* (so named on account of its wildness).

SANTIAGO=SAINT JAMES (so called in honor of the Apostle James, patron of Spain);—SANTANDER=SAINT ANDREW.

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\* This portion of Dr. Ganzenmüller's MS. was received too late for the BULLETIN of June 30, in which it should have preceded the remarks on France.

PORTUGUESE : *sérva*=mountains, *cābo*=cape; *pórtu*=harbor; — *açór*=hawk; *rôca*=rock; — *estrélla*=star; *são*=saint, holy; *o*=the (masc. sing.); — *de*=of, *da*=of the (fem.).

The AZORES=ISLANDS OF HAWKS (so called from the great number of hawks found there).—CABO DA ROCA=THE ROCKY CAPE (the steep western point of Europe; —CABO SÃO VICENTE=CAPE OF SAINT VINCENT, —SERRA D'ESTRELLA=MOUNTAINS OF THE STAR, *or* STAR RANGE.

PORTO=HARBOR (also named *Oporto*=the harbor).

GREEK : *πόλις*=city, *Πομπείος*=Pompey, *πίτυς*=pine; — *ἐσπέρα*=(evening), *west*; — *βάλλειν*=to sling.

The PITYUSES (in Greek *Πιτυούσσαι*)=ISLANDS OF PINES; —BALEARIC ISLANDS=ISLANDS OF SLINGERS (the Balearian slingers are celebrated in the military annals of antiquity).—HESPERIA (as the Iberian Peninsula was named by the ancient Greeks)=THE WESTERN COUNTRY, —*Pompeiopolis* (in Biscayan *Pomp-aelo*), now PAMPLUNA=CITY OF POMPEY (its reputed founder).

LATIN : *terra*=(earth), *land*, *pórtus*=harbor; — *Cæsar*=emperor; — *victōria*=victory, *pax*=peace (rest), *finis*=end; — *nóvus* (fem. *nóva*)=new.

CAPE FINISTERRE (*finis terræ*)=CAPE "LANDSEND." —*Portus Cale*, harbor of Cale, was the original name of the modern Porto, and from these two words is derived the Latin PORTUCALIA=COUNTRY ABOUT THE HARBOR OF CALE, now PORTUGAL; —*Pax Augusta*, now (in a Spanish corruption) BADAJOZ=REST OF AUGUSTUS (the Roman Emperor); —*Cæsarea Augusta*, now ZARAGOZA=CITY OF THE EMPEROR AUGUSTUS; —*Victoria*, now VITORIA=CITY OF VICTORY (battle A. D. 1813); — *Carthago nova*, now CARTAGENA=NEW CARTHAGE.

CELTIC: *pyra*, hence the PYRENEES=MOUNTAINS;—*dūr*, hence the DUERO RIVER.

BISCAYAN: From *ibárra* or *the great river* was derived the Latin *Ibērus*, the modern EBRO=STREAM; and from *ura*=water, and *asta*=rock is formed the compound ASTURIA=THE ROCKY COUNTRY ON THE WATER, or on the sea.

PHŒNICIAN: The ancient *Ibūsim*, the later *Ebūsus*, the modern IVIZA is synonymous with the Greek *Πινωβόσσα*, and means THE ISLAND OF PINES.—*Gadir*, later *Gades*, now CADIZ=(hedge), CASTLE (a Phœnician settlement).

ARABIAN: *jesireh*=(island, or also) *peninsula*;—*gēbel*=mountain, *wādi*=river, *gharb*=west;—*ābiad*=white, *kēbir*=great;—*al*=the.

From *Gebel al-Tarik* was derived GIBRALTAR=MOUNTAIN OF TARIK (a Moorish general, who conquered this place, A. D. 712).—The *Bætis*, etc., see . . . p. 213.

SOUTH AND CENTRAL AMERICA MEXICO, WEST INDIES.\*

SPANISH: *isla*=island, *cósta*=coast (coast region), *cābo*=cape, *punta*=point of land, *tierra*=land, (region), *istmo*=isthmus, *sierra*=mountains, *cordillera*=a chain, or a range of mountains, *cérro*=a ridge of mountain, *nevādo*=snowy mountain, *pīco*=peak; *riō*=river, *desaguadero*=a drain; *val*=valley, *angostura*=narrows, *páramo*=desert highland; *ciudad*=city, *villa*=town, city; *puerto* (in Portuguese *pôrto*),=port, harbor,—*nôrte*=north, *ecuādor*=equator; *dīos*=God, *espíritu*=spirit or ghost, *trinidad*=trinity, *salvador*=saviour;

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\* Instructions for pronunciation of Spanish and Portuguese words and names have been given on pp. 211–213.

*príncipe*=*prince*; *Andér* (Andrés),=*Andrew*, *Iago*=*James*, *José*=*Joseph*, *Juán*=*John*; *mādre*=*mother*; *Lūcia*=*Lucy*; *gallina*=*fowl*, *galāpago*=*turtle*, *anguilla*=*eel*; *pino*=*pine*, *pāsto* (and *pāsko*)=*pasturage*; *argentino*=(adj.) *silver*, *plāta*=*silver*, *esmerālda*=*emerald*, *arēna*=*sand*; *agüās*=*waters*; *pāta*=*paw*, or *large foot*, *cabéllo*=*hair*; *cruz*=*cross* (crucifix), *pīlar*=*pillar*;—*pāso*=*passage*, *parāiso*=*paradise*, *aire* (plur. *aires* or *áyres*)=*air*, *fūego*=*fire*;—*dominīca*=*Sunday*, *domingo*=*Sunday*, *Lord's Day*, *asúncion*=*assumption*, *paz*=*peace*;—*grācias*=*thanks*, *grānde*=*great*, *mayór*=*greater*, *blānco*=*white*, *colorādo*=*red* (or *colored*), *vermējo*=*red*, *nēgro*=*black*, *caliēnte*=*hot* (ardent), *templāda*=*temperate*, *frío*=*cold*, *nevādo* (fem. *nevāda*)=*snow covered*, *snowy*, *rápido*=*rapid*, *salādo*=(*salty*), *brackish*, *dúlce*=*sweet*, *fresh* (water);—*būeno*=*good*, *vēro*=*true*, *rico*=*rich*, *rēal*=*royal*, *san*, *sant* (fem. *sānta*)=*saint* (holy);—*el* (plur. *los*)=*the* (masc.) *la*=*the* (fem.);—*de*=*of* (gen., with the masc. article *del*=*of the*); *a*=*to* (dat).

TIERRA DEL FUEGO=LAND OF FIRE (so named by Magellan on account of *great fires* which he saw along the coast and which he supposed to be the eruption of volcanoes);—TRINIDAD (*island*) was discovered by Columbus, on the 31st of July, 1498, and received its name in honor of *the Holy TRINITY*;—SAN SALVADOR (*island, country and city*)=THE HOLY SAVIOUR;—SANTA LUCIA=SAINT LUCY (discovered by Columbus, on the 13th of December, 1498, the day of Santa Lucia);—DOMINICA (*island*)=SUNDAY (discovered by Columbus on the 3d of November, 1493, a Sunday, in ecclesiastical Spanish *dominīca*, Lord's Day);—SANTO DOMINGO (*island, state,*

and *city*)=THE HOLY SUNDAY, or *holy Sabbath*);—ISLAS DE LOS GALÁPAGOS=ISLANDS OF TURTLES;—ISLA DE PINOS=ISLAND OF PINES;—ANGUILLA=EEL—(*island*); PUERTO RICO, in Portuguese *Porto Rico* (*island and city*)=THE RICH HARBOR.—CABO DE LAS GALLINAS=CAPE OF FOWLS;—CABO DE LA SANTA CRUZ=CAPE HOLY CROSS :—CABO DEL PILAR=CAPE OF PILLARS (or *columns*);—CABO DE GRACIAS A DIOS=CAPE THANKS TO GOD!—PUNTA DE ARENAS=SANDY CAPE (or *sandy point of land*).—THE CORDILLERAS=THE CHAINS OF MOUNTAINS; “*Andes*,” from Peruvian “*anti*,” signifies *copper*, or *metal* in general, and *the* CORDILLERAS DE LOS ANDES, therefore, means *the* CHAINS OF THE METAL or *copper mountains*;—CORDILLERA REAL=THE ROYAL CORDILLERA;—SIERRA MADRE=MOTHER MOUNTAINS (so called in distinction from the chains running out from this range of mountains);—SIERRA NEVADA DE SANTA MARTA=THE SNOWY MOUNTAINS OF SAINT MARTHA;—NEVADO DE SORATA=THE SNOWY PEAK OF SORATA;—PICO DE ORIZABA=PEAK OF ORIZABA (so the *Citlaltépetl* is named by the Spaniards);—PICO MAYOR=THE GREATER PEAK (*i. e.* the *Popocatepetl*);—PÁRAMOS=DESERT HIGHLANDS (in the Cordilleras);—RIO COLORADO=RED RIVER;—RIO VERMEJO=RED RIVER;—RIO NEGRO=BLACK RIVER;—RIO GRANDE DEL NORTE=GREAT RIVER OF THE NORTH;—RIO RAPIDO=THE RAPID RIVER, also named RIO DE SANTANDER=RIVER OF ST. ANDREW (in Mexico);—(*Rio de*) LA PLATA=(*river, or stream of*) SILVER (so called by Diego Garcia, in 1527, from the silver brought to him by the natives);—RIO DE SAN JUAN=RIVER OF ST. JOHN;—RIO SALADO=THE BRACKISH RIVER: RIO DULCE (in Argentina and Guatemala)=THE RIVER OF

FRESH WATER;—DESAGUADERO=A DRAIN (*i. e.* from LAKE TITICACA to LAKE PANSÁ).

In *Mexico* and *Central America* the belts of land are distinguished as: TIERRAS CALIENTES=THE HOT REGIONS (on the coast), TIERRAS TEMPLADAS=THE TEMPERATE REGIONS, and TIERRAS FRIAS=THE COLD REGIONS (*i. e.* the highland);—COSTA RICA=RICH COAST; EL ISTMO=THE ISTHMUS (of Panama);—ECUADOR=EQUATOR (so named from its position under the equatorial line);—ARGENTINA=LAND OF SILVER;—PATAGONIA=LAND OF THE MEN WITH LARGE FEET (so called by the discoverer Magellan and his companions, from the large-footed men (*Pata-gones*) found there (see pp. 370-371, JOURNAL A. G. S., 1887);—BOLIVIA=LAND OF BOLIVAR, liberator of the South American States from Spanish dominion;—COLOMBIA=LAND OF COLUMBUS.

ANGOSTURA=(*city on the*) NARROWS (*of the Orinoco*); it is also named CIUDAD BOLIVAR=CITY OF BOLIVAR;—VILLA DE MINAS=CITY OF MINES (in Uruguay);—CIUDAD REAL=ROYAL CITY (in Mexico);—PUERTO PRINCIPE=HARBOR (OF THE) PRINCE;—PUERTO CABELLO=HARBOR OF HAIRS;—ESMERALDA=EMERALD;—AGUAS CALIENTES=HOT WATERS or *springs* (in Mexico);—EL PASO (*del Norte*)=THE (*northern*) PASSAGE (a frontier-town of Mexico);—PASTO, and PASCO=(*place of*) PASTURAGE; hence CERRO (*ridge of mountain*) DE PASTO, and CERRO DE PASCO;—VALPARAISO=VALLEY OF PARADISE; VERA CRUZ=THE TRUE CROSS;—SANTA FÉ=THE HOLY FAITH;—ASUNCION=(*the city of*) ASSUMPTION; LA PAZ=THE PEACE (or *place of peace*) in Bolivia and Lower California;—BUENOS AYRES=GOOD AIR.—ESPIRITU SANTO=(*city of the*) HOLY GHOST (on the island of Cuba);—SANTIAGO



=ST. JAMES;—SAN JOSE=ST. JOSEPH;—SAN JUAN=ST. JOHN.

PORTUGUESE: *bahia*=bay, *cabo*=cape, *recife*=reef, *serra*=mountains, *cordilheira*=a chain of mountains, *riô*=river (water), *bárrea*=a narrow entrance;—*cidade*=city, *villa*=(village), town, city; *pôrto*=harbor; *o santo* (plur. *os santos*)=the saint;—*Lúis*=Lewis, *Pédro*=Peter;—*Roque* (*Röke*)=*Rochus*;—*madeiro*=wood; *sélva*=forest; *mátto*=copsewood, bushes;—*mina* (plur. *minas*)=*mine*; *ouro*=gold;—*espinhaço*=(the spine, and) a ridge of mountain; *Janéiro*=January;—*nôrte*=north, *sul*=south, *brânco*=white, *nêgro*=black, *prêto*=black, *grósso*=large, *grande*=great, *béllo* (fem. *bélla*)=beautiful, *segûro*=secure, *alêgre*=(vivid), frequented, *gerál* (plur. *gerdês*)=general; *diamantino* (fem. *diamantina*)=rich in diamonds; *são*=saint, holy;—*tôdo* (plur. *tôdos*)=all; *o* (plur. *os*)=the (masc.), *de*=of (genit., with the masc. article: *do*=of the).

BAHIA DE TODOS OS SANTOS=BAY OF ALL THE SAINTS (discovered on *All Saints' Day*, in 1503).—CABO BRANCO=THE WHITE CAPE;—CABO DE SAN ROQUE=CAPE OF ST. ROCHUS (so named because it was discovered on the 16th of August, 1502, the day of *St. Rochus*);—SERRA DO ESPINHAÇO=THE RIDGE OF MOUNTAINS;—CORDILHEIRA GRANDE=THE GREAT CORDILHEIRA (*the great chain of mountains*);—CORDILHEIRA GERAL=THE GENERAL CORDILHEIRA.—RIO BRANCO=THE WHITE RIVER, a tributary of the RIO NEGRO=THE BLACK RIVER;—RIO GRANDE DO SUL=GREAT RIVER OF THE SOUTH (River and Province in Southern Brazil, so called in distinction from the RIO GRANDE DO NORTE=GREAT RIVER OF THE NORTH;—MADEIRA=WOOD RIVER (it

carries along great tree-trunks in times of floods);—SELVAS=FORESTS;—MATTO GROSSO=THICK COPSE WOOD;—MINAS GERAES=GENERAL MINES.

BAHIA (city)=BAY;—(*Cidade de*) RECIFE (*de Pernambuco*)=(*city on the*) REEF (*of Pernambuco*);—VILLA BELLA=THE BEAUTIFUL VILLAGE, or *city*;—PORTO SEGURO=THE SECURE HARBOR;—PORTO ALEGRE=THE FREQUENTED HARBOR;—RIO DE JANEIRO=WATER OF JANUARIUS (it is situated on an arm of the sea named "*Janeiro*," probably from its discovery by Solis on the feast-day of *Januarius*, January 1, 1501);—BARRA DO RIO NEGRO=THE NARROW ENTRANCE INTO THE BLACK RIVER;—OURO PRETO=THE BLACK GOLD;—DIAMANTINO (in Matto Grosso)=and DIAMANTINA (in Minas Geraes)=RICH IN DIAMONDS;—SÃO LUIS=SAINT LEWIS;—SÃO PAULO=SAINT PAUL; SÃO PEDRO (*do Rio Grande*)=SAINT PETER (*on the great river*).

\* The settlement of BLUMENAU in Brazil was founded by the German physician, DR. BLUMENAU, of Brunswick, in 1850.

FRENCH: *port*=harbor, *terre* (terr)=land, *prince* (pröss)=prince;—*Pierre* (Pierr)=Peter, *Thomé* (Tomê)=Thomas;—*croix* (kröä)=cross:—*grand* (grâ)=great, *basse* (bass)=low; *St.*, *saint* (să)=saint, holy;—*au* (ô)=to the (dat).

ST. CROIX (island, and city)=HOLY CROSS;—ST. THOMÉ=SAINT THOMAS.—The island of *Guadeloupe* is divided into GRANDE TERRE=THE GREAT LAND, and BASSE TERRE=THE LOWER LAND;—PORT AU PRINCE=HARBOR OF THE PRINCE;—ST. PIERRE=SAINT PETER (on the island of *Guadeloupe*).

\* Definitions of some *Mexican geographical names*

have been given on p. 371, JOURNAL, A. G. S., 1887.

In the *language of the natives of South America* ORINOCO means a STREAM, *para*, hence PARANÁ=RIVER and PARAGUAY=RIVER OF PARROTS; ÁRAU=*free*, and, therefore, ARAUCANIANS (in Chile)=THE FREE MEN;—PETCHIERAIS=FRIENDS (so named from their addressing the strangers by the word "*petcherais*").

The STAITS OF MAGELLAN, so called because discovered and first navigated by *Magalhães*, or MAGELLAN (Spanish), a Portuguese navigator in the Spanish service, in the first voyage round the world (1519–20).—The name of ANTILLES originated from a *mythological island*, ANTILLA, which the first discoverers thought to have found in the island of Hayti.—The VIRGIN ISLANDS were discovered by Columbus, in 1494, and so called by him (in honor of the "*eleven thousand VIRGINS*").—The FALKLAND ISLANDS were first named after the *English Lord* FALKLAND, but, afterwards, *Isles Malouines* (by French navigators of *St. Malo*); hence in English MALOUINE ISLANDS.—JUAN FERNANDEZ (island) was discovered by a navigator of the same name, in 1576.—CAPE HORN (*Hoorn*) was so called by the Dutch discover, Schouten, after his native town, the *city of* HOORN, in Holland; and ASPINWALL (Colon) took its name from ASPINWALL, *the builder of the railway over the isthmus of Panama*.

\*After European cities, *Cordoba* (in the Argentine Republic), *Granada*, and *Leon* (in Nicaragua), *Nassau* (on the island of New Providence), *Valencia* (in Venezuela) and many others.

# FOUR WEEKS IN THE WILDERNESS OF SINAI, WITH NOTES ON EGYPT.\*

BY

DR. H. CARRINGTON BOLTON.

It is to be remembered that my experience in the Peninsula of Sinai was limited to a single visit.

Arriving in Cairo February 1st, 1889, I spent the first week of this month in Cairo, the second and third on the Nile, the fourth, and the first two weeks of March, again in Cairo and vicinity. I entered the desert, March 13th, and four weeks later returned to Cairo, finally leaving Egypt on April 15th.

In the earlier weeks named, the temperature at the hotel in Cairo ranged from  $60^{\circ}$  to  $65^{\circ}$  at 8 A. M. to  $75^{\circ}$  and  $78^{\circ}$  at 3 P. M., falling to  $64^{\circ}$  and  $67^{\circ}$  in the evening. In April it was warmer, but never oppressive in the shade. On the Nile steamer greater extremes were noted;  $54^{\circ}$  at midnight (Feb. 19th) to  $87^{\circ}$  at 2.30 P. M. (Feb. 9th). The latter figure was exceptional and was regarded as oppressive, but the changes in any period of 24 hours are not commonly very great. Luxor is attaining some reputation as a health resort, on account of the equable temperature and dryness of the atmosphere. In the first three months of 1889, the average temperature out of doors at the hotel is thus given :

	9 A.M.	2 P.M.	6 P.M.
January...	$60^{\circ}$	$68^{\circ}$	$65^{\circ}$
February.....	$60^{\circ}$	$70^{\circ}$	$68^{\circ}$
March .....	$71^{\circ}$	$81^{\circ}$	$78^{\circ}$

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\* A paper read by Dr. Bolton before the New York Academy of Sciences.

Authorities state that, as a result of ten years' observations, the mean temperature in the Delta and at Cairo is  $58^{\circ}$  in winter,  $83^{\circ}$  in summer, and  $66^{\circ}$  in autumn; the lowest record in the Delta is  $35^{\circ}$ , the highest about  $95^{\circ}$  in the shade. In Upper Egypt, however, the temperature rises to  $109^{\circ}$ .

The temperatures that I noted in the desert of Sinai were taken at great differences of elevation, my route extending from the sea-level to the summit of Jebel Mousa, 7,400 feet high. I copy a few records from my journal.

*In Plain of Shur (perhaps 50 ft. above sea-level.)*

March	13th.....	7.30 A.M.	$59^{\circ}$
"	".....	3.00 P.M.	$80^{\circ}$ in sun
"	".....	8.30 P.M.	$66^{\circ}$
March	14th.....	7.00 A.M.	$50^{\circ}$
"	".....	7.00 P.M.	$70^{\circ}$
March	15th.....	7.00 A.M.	$62^{\circ}$
"	".....	9.30 P.M.	$75^{\circ}$ (south wind)

*In Wadi Feirân, and beyond.*

March	19th.....	6.30 A.M.	$52^{\circ}$ (rain)
"	".....	9.00 P.M.	$52^{\circ}$

*At Monastery of St. Catherine (5,000 ft.)*

March	21st.....	8.00 A.M.	$48^{\circ}$
"	".....	9.00 P.M.	$55^{\circ}$
March	22d.....	6.30 A.M.	$46^{\circ}$
"	".....	10.00 P.M.	$56^{\circ}$
March	23d.....	8.00 A.M.	$57^{\circ}$
"	".....	9.30 P.M.	$60^{\circ}$
March	24th.....	7.00 A.M.	$54^{\circ}$
"	".....	10.00 P.M.	$62^{\circ}$
March	25th.....	7.30 A.M.	$59^{\circ}$
"	".....	11.00 A.M.	$72^{\circ}$
"	".....	10.30 P.M.	$66^{\circ}$
March	26th.....	7.00 A.M.	$62^{\circ}$
"	".....	9.00 P.M.	$66^{\circ}$

*Wadi Es-Sleh to Tor.*

March	29th.....	6.00 A.M.	(Wadi) $67^{\circ}$ (1,500 ft.)
"	".....	3.00 P.M.	(Tor) $88^{\circ}$
"	".....	10.00 P.M.	(Tor) $75^{\circ}$

*Summit of Jebel Mousa (7,400 ft.)*

March 22d.	.....	9.30 A.M. in shade, 46°
"	.....	" in sun, 70°

*Camp on Gulf of Suez.*

March 31st.	.....	9.00 A.M. in sun, 88°
"	.....	" in shade, 72°

*On Seetzens Slope, Jebel Nagous.*

March 31st.	.....	11.00 A.M. in sun, 86°
"	.....	" in shade, 72.5°
"	.....	2.00 P.M. in sun, 100.5°

The highest evening temperature was on March 17th, after the Khamsin had blown all day,—at 7 P. M., 84°. The lowest temperature observed was on March 20th, in camp about 3,000 feet above the sea,—at 6.30 A. M., 33°.

My first experience in Egypt was calculated to give the impression that it is a rainy country, for I saw two showers in three days. In passing through the Suez Canal (January 31st), a heavy shower, lasting half an hour, drove the passengers to shelter, and a brilliant rainbow delighted beholders. Two days later, rain again fell at night in Cairo. Of course this experience was exceptional in Cairo. The rainfall at Alexandria is about 8 inches per annum, and at Cairo about 1.2 inches; while in Upper Egypt there are adults living who say they have never seen rain.

I noticed, on the other hand, unmistakable signs of recent rains, such as dried mud-puddles, raindrop-prints, etc., at several points, near Cairo, east of Thebes (Wadi Bab-el-Molook), and in the peninsula of Sinai, and I was impressed with the belief that more rain falls in Egypt than is usually supposed. A local shower passing over a sandy, gravelly region, makes but little



impress on it; and there is no corps of trained observers, outside of Cairo and Alexandria, to record the phenomenon. On visiting the Khedivial Astronomical Observatory just out of Cairo, I was cordially received by the Director, Mr. T. Esmatt, a graduate of the Ecole Polytechnique of Paris, and for three years an assistant in the Naval Observatory at Washington. I take pleasure in mentioning his politeness and courtesy, but cannot omit pointing out a weakness; he took me to the roof of the building to see the meteorological instruments, and I noted that the rain-gauge was quite full of water; this again gave me reason to regard Egypt as a rainy country. (The last shower fell one month previously.)

Being on the lookout for signs of water in the desert of Sinai, I made the following notes:—The slight depressions in broad plains and the deep, narrow valleys in the hill country, both indiscriminately called wadis, present the appearance of dried-up water-courses: the signs are unmistakable,—a tortuous channel with vertical sides carved out of the gravelly bottom, pebbles and boulders transported from distant sources scattered over the surface, mud-flakes and mud-cracks in small bays, as it were, at the sides of the main channels. At two or three places on the sea-coast, extensive mud-flats were pitted with characteristic raindrop impressions. The line of the now arid water-course was often bordered by scanty and hardy shrubs.

Between March 13th and April 8th (1889) rain fell three times in my vicinity; twice the fall was insignificant, but on March 19th rain fell abundantly in Wadi Feirân, from 7.15 A. M. to 9.30 A. M. Heavy mists had

obscured the peaks bordering this extensive valley nearly all the preceding day; the temperature during this rainfall was  $52^{\circ}$ , elevation about 1,900 feet.

That heavy falls of rain and even of snow occur in December and January in the Sinai region, is reported by many travellers; in the defile of Nakb-el-Hawi (5,000 feet) crossed by pilgrims *en route* for the sacred mountain, the winter rains make veritable torrents; in 1867 the water rose to such a height in the valley adjoining Wadi-Selâf, as to wash away a camp of Bedouins, causing a loss of 40 lives and of numerous cattle (Baedeker). Captain Palmer describes also a sudden precipitation so copious as to fill the bottom of Wadi Feirân to the depth of several feet, causing the party to seek high ground. That the Oasis of Feirân was once a site sufficiently important to become an Episcopal See, is known to students of history; this was in the second to the sixth century A. D. A few cut stones, the capital of one column, and ruined sites, alone remain to indicate the locality.

Judging by the great boulders and trunks of palms which I saw in the lower part of this valley, I am disposed to believe that heavy rains are not infrequent. Casual observations by travellers, who move their tents almost daily, are unreliable data for scientific conclusions as to the meteorology of the country. Unfortunately, the monks residing at the Monastery of St. Catherine, care for none of these things.

Returning for a moment in thought to the Nile valley, I note that although the sun usually shines with great brilliancy, it is a mistake to infer that the sky is uniformly cloudless. In March there were many cloudy

days, some of which would, in this country, have been regarded as rain precursors.

Powerful winds sweep across the plains and through the valleys of Arabia Petræa, with a violence and continuity that I have not elsewhere experienced. In the spring months the prevailing wind in the desert is from the north and northwest, down the Gulf. This wind is a cool one, but it occasionally veers around to the south and becomes oppressively hot. In April and May this south wind, called *Khamsîn*, blows unremittingly for days together, scorching the traveller's skin and filling the orifices in his head with a very fine dry dust. *Khamsîn* is from an Arabic word meaning fifty, so called from a mistaken notion that it blows for a period of fifty days before the summer solstice.\*

In the Nile valley, north winds prevail during the heated period of eight months, and southern winds during the rest of the year; these being in the opposite direction from the winds in the region of the Red Sea.

I witnessed three characteristic sand-storms at localities far apart and under varied circumstances. On February 15th, when riding a donkey through Thebes Nileward, a powerful west wind arose in the afternoon, blowing before it the fine dust from the Libyan desert. Words fail to describe the discomfort of such a sand-storm; the fine dust seems able to penetrate everything except perhaps an unbroken egg, and it is quite impossible to escape from it; to prevent suffocation, I borrowed from a fellah a coarse yet closely-woven blue outer garment and wrapped my head up. Donkeys did

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\* The dictionaries agree in defining *Khamsîn* as a wind that blows for fifty days, beginning about the time of the vernal equinox.

not seem to enjoy the phenomenon any better than the Bedouins, and they shrunk from its blast as well as the travellers. On reaching the river, we alighted, but found the waves so high that boats could not cross to take us over, and we had to wait in patience until the force of the wind was spent. I tried lying down on the shelving shore, but the coarser grains of sand driven near the surface cut into the skin with painful effects. After crossing to Luxor in a boat, we found the residents in the large hotel much inconvenienced by the penetrating dust, although the building is screened by a handsome garden.

My second experience was in Cairo itself. On March 6th a northwest, and consequently a cool, wind blew dust from the adjoining desert into the city with such power as to obscure the usually brilliant sun during an entire day. The barometer fell 0.46 inch at the time, and the thermometer indicated 66° at 8.30 A. M., and 67° at 10.30 P. M. Residents of Cairo said that the sand-storm was the severest in twenty-five years, and of an unusual character,—being accompanied by a low temperature instead of the scorching Khamsin. The following day was clear and cool. The dust penetrated every cranny and gave hotel servants hours of labor.

I experienced a third sand-storm in the desert of Sinai, on the plain of El Markha; it was accompanied by a scorching south wind, and the drying effects on the skin and the capital orifices produced greater discomfort than the suffocating dust and cutting sand; my party could do nothing but sit in silence on the camels, facing the storm, and the poor animals forgot to snatch at the tufts of scanty shrubs, as is their custom. After

crossing the plain, we entered a defile and rose to a considerable height on the Nakb-el-Budra ; the sand-storm continued, quite spoiling our enjoyment of the wild scenery and making photography impossible. In the evening the fierce wind very nearly overturned our tents in spite of extra stays, and at dinner every course was seasoned with the all-penetrating dust. The temperature at 7 P. M. was abnormally high, 84° ; just twenty-four hours later it had fallen to 58°, the wind having meanwhile veered around to the north, bringing with it heavy mists.

A single instance of electrical display was observed on March 26th, while in camp at Sinai. My companion, Henry A. Sim, Esq., of the Madras Civil Service, while lying in the tent, drew bright sparks from the woollen blankets by friction ; the temperature without was about 64°.

Before dismissing the subject of climate, I wish to testify to the invigorating, delightful air in the desert ; it has a bracing quality that enables one to expend much energy without fatigue. From about 1 to 3 P. M. the glare of the sun is often great, and shade is a comfort ; but the constant breeze, sometimes rather too strong, tempers the heat. I suspect, too, that the air is very free from disease-germs.

Of the dreaded Khamsin, however, I can say nothing favorable.

I made several excursions in the neighborhood of Cairo ; on the west lies the river, and across the bridges cultivated fields so far as irrigated ; beyond that the Libyan desert. On the east the quick transition from the streets of a city, swarming with 400,000 inhabi-

tants, to the sterile desert, is very striking; passing through an arched gateway, and by some sorry-looking Mohammedan burying-places, one immediately finds himself on gravelly undulating plains, devoid of water or foliage, extending in monotonous uniformity to the Gulf of Suez, about 80 miles distant. Jebel Mokattam, a lime-stone range on the south, rises nearly 500 feet above the city; my aneroid gave the elevation of the highest point overlooking Cairo as 694 feet above the sea-level, or 485 feet above Shepherd's Hotel. The desert, broken occasionally by low ranges of hills, has a hard gravel and pebble floor, chiefly limestone, with fragments of silex in the form of brown flint and chalcedony. Loose sand lies only in hollows between hill-ocks, the tops of which are wind-blown and bare. On the surface at certain points lie fragments of fossil wood, and rarely half-buried trunks of the same; it is dignified by the name of "Petrified Forest." Some of this fossil wood proves to be good phonolite.

I noticed here again evidences of water-courses, recent mud-flakes, etc. At the time of my visit the customary strong cool breeze prevailed, and the temperature was 74° in the shade at noon (March 8th).

On February 16th I visited a wild valley west of Thebes, known as Wadi Bab-el-Molook, celebrated for the numerous and well-preserved Tombs of the Kings, of great interest to archæologists. My experience and impressions of this arid region were as follows:

Passing from the river bank through green cultivated fields of the Nile basin, the sterile, gravelly desert begins abruptly, the sudden transition being determined



by the irrigating canals and channels. At the mouth of the valley, about two miles from the Nile, the scene is one of utter desolation; absolutely no vegetation of any description is visible, not a dry lichen nor a gray shrub. Beneath the feet is a hard gravelly floor, grayish-white in color, consisting of broken and powdered limestone from the neighborhood, intermingled with nodules and pebbles of silex. True flint, from white to liver-brown in color, and having characteristic conchoidal fracture, is abundant. The silex commonly takes the concretionary form, some of the shell-like and ring-shaped masses reminding one of fossils. But little sand is present.

At the entrance of the valley the hills rise at a gentle slope, their sides being here and there dotted with large masses of limestone with a firm cement, or rather with seams, of dark-colored quartz. The strata, as seen by the unaided eye, appear to be horizontal. The rock has a shaly character in places, being deeply weather-eaten, friable, and soft. Ascending the valley, a spur divides it into two converging ravines; following the longer one to the west, the walls of limestone become precipitous, the quartzitic masses larger, and the general aspect wilder. At some places the limestone runs into chalk; this is especially well seen on entering one of the numerous Tombs of the Kings, the inclined passages penetrating hundreds of feet into the heart of the mountains.

The valley terminates in a *cul-de-sac*, about half a mile from its mouth, forming an amphitheatre of nearly vertical walls apparently 200 feet high, above which rise steep slopes perhaps 500 feet higher. These verti-

cal walls are split by vertical joints into broad or narrow columns, making picturesque features.

The valley throughout shows that water has at some time been energetically at work ; the floor resembles a dried-up mountain torrent ; banks of gravel, sand, and boulders rise several feet above the bridle-path on each side ; and at the lowest part, small channels wind about the large rocks. The hillsides are furrowed by ravines excavated by water. Here and there in low places, usually at the foot of a large boulder, were unmistakable signs of recently-formed mud. The scales and mud-cracks were quite fresh, and seemed to indicate that water had accumulated in pools not more than two or three weeks before. On my return to Luxor, I was informed that rain had fallen about three weeks before (February 16th).

A sharp peak rises high above the walls of the amphitheatre referred to ; on the slopes of this peak several parallel bands of horizontal limestone differ in compactness, the softer wears away rapidly and the harder projects over the shaly inclines.

Climbing up a steep path, and crossing the narrow ridge through a slight depression, I descended into the valley of the Nile ; limestone passed into shale, and this into cultivated ground. The numerous excavations of small tombs, the grand ruins of the Rameseum and of Medinet Haboo, with the Colossi standing like sentinels on the plain, now drew off my attention from the geological features of the place.

The physical geography of the Sinai region is rarely represented with accuracy on published maps ; Sinai often appears as an isolated peak, or at most as a detached



MT. SINAI.

group of mountains, whereas the whole peninsula is covered with sterile hills and clusters of mountains, except on the borders of the three seas by which it is bounded. The best maps known to me are those published by the Ordnance Survey, and by the Admiralty of Great Britain; these seem to be topographically complete, but Jebel Nagous is not shown with accuracy. My own observations were limited to the following route: from Suez to Sinai by the usual caravan route through Wadi Feirân, thence through Wadi Es-Sleh to Tor on the Gulf, and back to Suez by the usual route along the sea-coast, a distance of about 380 miles. The region, which is about the size of New Hampshire, contains within its boundaries three marked features:

comparatively level plains, low ranges of limestone and sandstone hills, and an irregular group of bold granite mountains whose peaks rise to the height of 8,000 feet. Each of these regions is furrowed by wadis, or dry water-courses, which present very different aspects in the three divisions named. In passing from Suez to Sinai, by the usual route, one meets these features in the order named.

The first 52 miles of the journey, occupying about two days and a half, as camels travel, passes over an arid, sterile plain about ten miles wide from the low range of limestone hills on the east, Et Tih, to the Gulf on the west. This plain, like that of El Gâa, to the south, rises gradually from the sea to the foothills, and is undulating towards its southern end. It is crossed by broad, shallow wadis, running east and west, which were perfectly dry at the time of my visit; Wadi Werdân, the largest, is depressed but a foot or two below the level of the plain and is approximately three miles in width at about six miles from the point where it enters the sea.

The most extensive plain on the western side of the Peninsula is that of El Gâa, which is about 80 miles long and 15 wide at its widest point. From the sea-coast to the mountains bordering it on the east, it rises nearly 1,000 feet, but so gradually as to deceive the eye and appear level. It is crossed by many shallow wadis, and its northern half is separated from the sea by a range of limestone hills (Jebel-el-Araba) reaching a height of 1,600 feet. When the plain was covered by the sea, this range was probably an island, or series of islands. The plain is rarely broken by hills, the sharp-pointed

Krên Utûd, conspicuous from a distance, being an exception. I crossed the monotonous desolate waste, from the mouth of the beautiful Wadi Es-Sleh to Tor (or Tûr), on the Gulf, a distance of about 15 miles, and noted scarcely a dozen tufts of plants; water is absolutely wanting. North of Tor, however, and east of Jebel-el-Araba, are palm-gardens that extend for several miles in a narrow belt; and these date-bearing trees owe their existence to several saline springs, occurring at intervals, some of which are quite warm. On this sterile plain, the characteristics of a desert are seen in perfection; the level expanse is not too broad to conceal the lofty mountains on the east, nor to prevent glimpses of the blue sea on the western horizon; the floor is a firm hard surface, made up of a compact mixture of gravel and coarse sand, so hard indeed that camels make no impress on it with their broad feet. At some places the surface pebbles are of many shades of brown, intermingled with black and white, and these are so closely laid and regularly distributed as to resemble a mosaic pavement, but of course a patternless one. The surface particles are generally coarser than those immediately beneath; they are chiefly limestone, sometimes of coralline limestone, intermingled with flint and other varieties of amorphous quartz. Many of the pebbles show on their surface beautifully regular pittings and furrows carved out by the wind-driven sand. The fine-grained sand has all been lifted high in air by the powerful winds, whirled away and dropped into depressions or on the lee sides of hills. Hundreds of acres have no surface stones larger than an ostrich-egg; no water whatever is found in this region, much



less any signs of vegetable or animal life, rarely even a passing bird.

On this desolate plain, when overtaken by night, one place is as good (or bad) as another for pitching the tents, unless perhaps a small hillock is reached, which may serve as a partial shelter from the gales that sometimes threaten to overturn the canvas.

In the region of extensive plains, the wadis, or dried-up water-courses, being depressed but little, closely resemble them. The floor of the wadi hardly differs from that of the plain, except when a torrent has swept before it large boulders and deposited them irregularly in its bed. The sorting power of the water, however, is noticeable, as also the well-defined vertical walls, perhaps only a few inches deep, excavated at the point of lowest level. On the margins, too, of the wadis of the plain, and at points protected from the full force of the winter floods, several varieties of green shrubs grow in widely separated tufts. I often remarked mud-cracks, apparently of recent date; but these indications of water probably remain undisturbed in this desolate region for a considerable period, perhaps for several seasons.

In the limestone hills these wadis take the form of cañons, having nearly vertical walls, sometimes hundreds of feet high—as in Wadi Tayyibeh. The regular erosion on their sides produces often picturesque effects, as at Ras Abu Zanimah.

In the granitic district the wadis form V-shaped valleys broken by narrower ones entering at right angles, and bounded by bold peaks many thousand feet above the beholder. In the beds of these wadis are scattered specimens of the rocks of the surrounding country;



often boulders of great size testify to the violence of the torrents during the winter months, especially in Wadi Feirân.

The absolute dependence of the population of Egypt upon the Nile is a familiar fact.

The conditions of occurrence of water in the desert are perhaps less familiar. Not only is water scarce, but when obtained a large proportion of it is saturated with saline matter to such an extent that the soil in the vicinity is white with efflorescent salts of soda, magnesia, and lime. The "bitter waters" of Marah are not exceptional. The longest journey that I made without meeting good drinking-water was on the return from Tor to Suez, a distance of about 150 miles, occupying six-and-a-half days. On this route we passed a well in Wadi Gharundel where camels and Bedouins slacked their thirst, and our water-barrel was replenished with water for washing; but had we not been supplied with sweet water from the Nile, brought down to Tor on a boat from Suez, we should have fared badly. At the time of my visit, all wells were very low, and in some places entirely dried up.

Good water, flowing from springs and running short distances,—say, a quarter of a mile before sinking into the thirsty soil,—is found in Wadi Feirân and in Wadi Tarfa. In the former place, many date-palms and even barley-fields make a charming oasis; at the latter, palms, canes, and tamarisks line the babbling brook, as it may truly be named, but the oasis is not extensive. North of Tor, on the Gulf, are flowing springs of warm and saline water, not very palatable, but admirably adapted to the culture of date-palms, of which there are many

thousand. The best drinking-water in the region that I visited is on the flanks of Sinai; there are four wells within the monastery walls, one without, and others in the Leja valley and vicinity.

The warm saline spring at the foot of Jebel Hammam Mousa, is described by several travellers as sulphurous; but at the time of my visit it was assuredly devoid of the characteristic taste and smell of sulphuretted hydrogen. Its temperature is  $92^{\circ}$ – $94^{\circ}$  and it is strongly saline.

Hot springs issue from caverns filled with steam at the base of Jebel Hammam Farûn, a mountain of crystalline limestone on the Gulf of Suez. Russegger says the vapor had a sulphurous smell and the walls of the caverns were encrusted with sulphur. The saline water has a temperature of  $153^{\circ}$ , and is used by the Bedouins for curative purposes.

In Wadi Es-Sleh, the romantic gorge southwest from Sinai, I discovered a cold and sweet sulphur spring, agreeable to the palate. It issues in the centre of the wadi, at a point two hours' journey east of its mouth, and flows a short distance, depositing characteristic bluish sulphur on its borders; it was this latter that first attracted my attention. This spring is not mentioned by Baedeker.

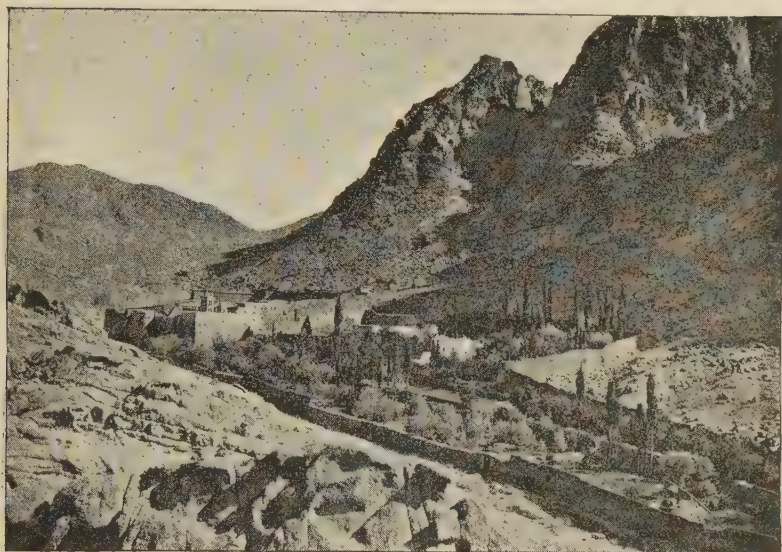
The total absence of ponds and lakes is a marked feature in the peninsula of Sinai; rain does at times fall in abundance, but it rushes down the wadis into the seas. Yet there is evidence of the existence of lakes at some earlier period; in Wadi Feirân, banks of earth 60 to 100 feet high rest on the mountain sides, especially in the angles of the valley, showing clearly the former

existence of a lake, the barrier of which was probably near Hererât. I noticed also at the point where the Wadi Es-Sleh enters the plain of El Gâa, unmistakable signs of an ancient lake; the wadi emerges suddenly from the mountain range, and a circular depression from 30 to 50 feet deep, with a perfectly level sandy bottom, and bounded by nearly vertical gravel cliffs, now marks the bed of a small lake.

The uninhabitability of the Peninsula is due to its sterility rather than to its climate; its sterility is due more to the unequal annual distribution of the water, than to its absence, and storage-dams, easily constructed in the narrow granite-walled wadis, would to a great degree remedy this defect. Perhaps at some future day, when a crowded world thrusts its population into regions now hardly habitable, Arabia Petræa will bloom like a garden. Granite and limestone furnish valuable soil ingredients, and the climate is not unfavorable to semi-tropical cultivation.

The extent to which evaporation from the surface cools the contents of the earthenware kullehs is notable; at 11 A. M. the temperature of the air in the shade was  $72^{\circ}$ , and that of the water in a goglet (kulleh) only  $53^{\circ}$ —a difference of 19 degrees. During the cold nights, the water in our barrels fell to a low temperature. A party of Americans who ascended Jebel Katharin, while I was camping at Sinai, found ice near the summit and enjoyed the luxury of iced water.

Fraas says of the Mt. Sinai group: "This huge range, composed of primeval gneiss and granite, has undergone no geological change since the time of formation of these crystalline masses; they have reared their ma-



MONASTERY OF SAINT-CATHERINE.

jestic summits above the ocean from the beginning of time, unaffected by the transitions of the Silurian or Devonian, the Triassic or chalk periods." At the base only do these mountains show any trace of alterations ; thus the Red Sea has on one side thrown a girdle of coral around Mt. Sinai, and so produced a coast district ; while towards the north the sea during the Cretaceous period has formed the limestone plateau of Et Tih (4,000 feet above sea-level), which stretches across the peninsula to Mt. Lebanon.

A very remarkable feature is the variety and beauty of the colors of the rocks ; in the limestone region every imaginable shade of yellow, red, brown, and gray, besides snow-white and quite black, give the barren cliffs a picturesque appearance ; in the granite region this gray

crystalline rock is traversed in all directions by dikes of eruptive diorite, varying in color from black to green and brick-red. In Wadi Tarfa I counted nine narrow red and green dikes in a space of twelve feet. Elsewhere the dikes varied in width from two inches to thirty feet and more; sometimes the red porphyry traversed the green, and sometimes both lined the same fissure in the granite. The colors are as well-defined as those on a geological map, and combining with the strong atmospheric coloring of an almost cloudless sky, that produces bright lights and deep shadows in the foreground and an indefinable haze on the distant mountains, together with the deep blue of the mis-named Red Sea, produce an incomparably artistic effect.

The main object of my journey being a search for sonorous sand, my attention was naturally directed to the occurrence of sand in general. Large banks of blown sand are characteristic features in the Nile valley, in the Libyan desert, and in the Peninsula. On the railroad from Ismailiya to Cairo, the authorities have found it necessary to construct long barricades, like our snow-fences, to prevent the drifting sand from burying the track out of sight. In the Nile valley, the fine dry sand has kindly done great service to archæologists; blown into underground galleries used for sepulture, it has preserved intact the artistically decorated walls. Opposite Assouan, Sir Francis Grenfell has recently opened a score of tombs, in which the paintings are as brilliant in color and polish as when completed by the Egyptian workmen centuries before.

As already intimated, loose sand into which the feet sink is confined to the bottom of deep wadis (Tarfa, Es-



Sleh, etc.) inaccessible to high winds, and to banks resting on comparatively level expanses (Gizeh, Ismailiya, etc.) or on the flanks of hills (Jebel Nagous, etc.) In Wadi Feirân, near its entrance into the Gulf of Suez, I noticed a prodigious bank of blown sand, with a rounded summit and regular outline, estimated to be 200 feet high. The bank of sand called Sectzen's Slope at Jebel Nagous, rests on the hillside to the height of nearly 400 feet. The dunes immediately on the sea are comparatively insignificant, eight to twelve feet high at the points reached on my route.

On the southern borders of Lake Timsah (an adjunct of the Suez Canal), a series of dunes extends for more than three miles; some of them rising to the height of 100 feet. At a point about three miles from Ismailiya, between the lake and a shallow lagoon separating it from the desert to the south, the north and south winds meet in an eddy, blowing up the fine yellowish sand in steep slopes, terminating in a long knife-edge ridge. On the steepest inclines the sand has the mobility observed at other localities; there were signs of spontaneous movement down the slope. I tested this sand, but all my efforts to coax sound out of it were futile. The sand beneath the surface was not so dry as that observed in the desert.

The dunes are quite without structure; the sand is uniform in grain and color, from the very edge of the lake up over the top of the ridge. No shrubs or blades of grass find foothold on the arid slope; the surface is everywhere marked by wind-furrows, except where obliterated by the spontaneous sliding mentioned.

The abrading and sculpturing by wind-driven sand



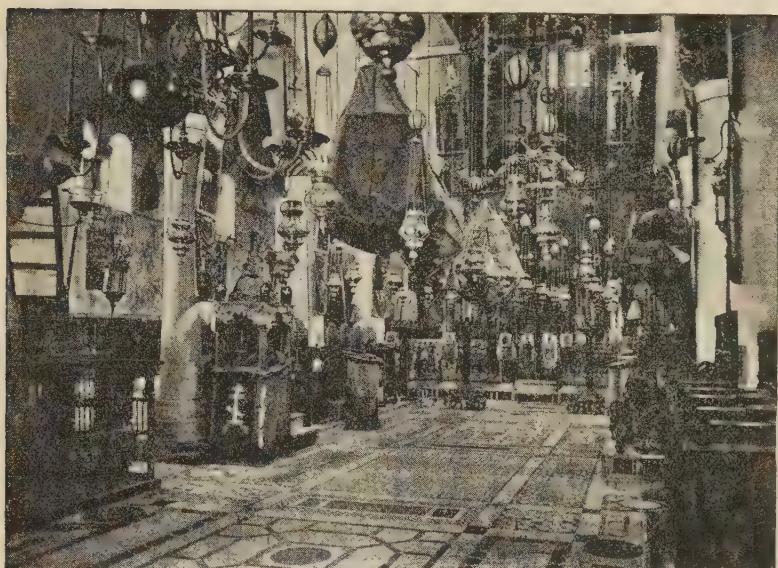
may be seen in many places ; on the Nile, inscriptions on granite temples and obelisks are sadly defaced where exposed to this agent ; and in the desert most picturesque effects are seen, especially in the sandstone region. On the plains, surface pebbles show a delicate pitting and furrowing caused by the sand-blast, not only on soft gypsum and limestone pebbles, but on crystalline quartz.

Minerally the Peninsula is very poor. I collected at different points snowy gypsum, fair selenite in imperfect crystals, and massive white chalk, and noted thin streaks of epidote, small garnets and quartz crystals. The turquoise-mines of Maghâra, which were worked under the Pharaohs, and reopened in 1863, are now abandoned.

The variety, beauty, and fragrance of the shrubs and flowers in the most forbidding and unexpected spots, were to my unprepared mind a remarkable feature. In March I gathered dandelions and daisies at Wadi Useit, also "butter and eggs" ; in Wadi Tayyibeh, near saline water, spearmint ; and in Wadi Feirân, on the hillsides, sorrel.

The oases with their date-palms, tarfa (or tamarisk) yielding manna, seyâl (or acacia) yielding gum-arabic, gharkad shrubs, and thickets of tall reeds, are veritable islands of fertility in an ocean of desolation. At the Monastery cypresses, oranges, peaches, and vines are cultivated, although 5,000 feet above the sea-level.

Naturalists enumerate a number of large animals that live in the oases of the desert, among them the gazelle, ibex, jackal, and fox. I met with the head of a gazelle and numerous horns of ibexes, and in Wadi Es-Sleh a



CHURCH OF THE TRANSFIGURATION (INTERIOR).

Bedouin suddenly appeared with two little half-tamed ibexes about fourteen days old; my travelling companion bought them, but they were unable to withstand the novelty of camel-riding, and, though kindly cared for, died within a few days. Their skins were preserved. I noted on the journey a large field-mouse, a small light yellow snake  $2\frac{1}{2}$  feet long, and a peculiar kind of a lizard (?) At Assouan I killed an intensely energetic scorpion, and at many places noted chameleons basking in the sun. Of the numerous and curious fish in the Red Sea, I can only say that some of them proved to be excellent food.

Insects were rarely seen in the desert, and only in the neighborhood of water, or in the oases. I observed red and black ants, one large caterpillar, very few flies, many

black beetles, leaving behind them well-defined tracks as they crawled over the fine-grained sand, a few moths, a bee, a grasshopper, many spiders, a lady-bird (so-called), gnats near the sea-coast; and my travelling companion noted fleas. Mosquitoes, so abundant in Cairo, were not seen nor heard. Twice large birds sailed high above our heads. This is the total of animal life met with in my four weeks' journey, excepting camels and goats.

## GEOGRAPHICAL NOTES.

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THE INTERNATIONAL GEOGRAPHICAL CONGRESS AT BERNE, IN 1891.—This Congress will be held in the week of the 10-15 August, 1891, during the celebration of the Seventh Centenary of the city of Berne.

The general programme embraces five divisions :

1. TECHNICAL GEOGRAPHY, including Mathematical Geography, Geodesy, Topography and Cartography, Instruments, Projection, The Universal Hour, A Prime Meridian, Orthography of Geographical Names, etc.
2. PHYSICAL GEOGRAPHY.—Configuration of the Land, Hypsometry, Hydrography, Maritime Geography, Variations of Climate, Terrestrial Magnetism, Botanical, Zoological and Geological Geography, Volcanoes, Earthquakes, Ethnography, Anthropology, etc.
3. COMMERCIAL GEOGRAPHY.—Population, Emigration, Agriculture, Means of Communication, Commerce, Industry, Production, Commercial Museums, Geographical Statistics.
4. EXPLORATIONS AND VOYAGES.—Travels, Expeditions, Explorations, Colonization, Religious Missions.
5. GEOGRAPHICAL INSTRUCTION AND THE DIFFUSION OF GEOGRAPHY.—Methods of Teaching, Models and Instruments, Wall Maps, Atlases, etc., Globes,

Primary, Secondary and Higher Instruction, Geographical Societies and Publications, Bibliography.

A fully detailed programme will be issued in March, 1891, with a list of communications to be made to the Congress.

THE UNIT MEASURE OF TIME.—Dr. Sanford Fleming, President of Section III. of the Royal Society of Canada, called attention at the opening meeting of the section to the necessity of a unification of time reckoning. There is, in fact, only one time; and, this somewhat revolutionary assertion once established, the way is made clear for a system of time reckoning for the whole globe.

Dr. Fleming referred to the recommendation made by the Washington Conference, in 1884, that time be computed according to the solar passage on a recognized zero meridian of the earth's surface. The unit measure may be defined as the interval of duration extending from one mean solar passage on the anti-meridian of Greenwich (selected by the Conference) to the next succeeding passage. This standard unit has been variously called A Universal Day, A Terrestrial Day, A Non-Local Day, A Cosmopolitan Day, A World Day, and a Cosmic Day; all inappropriate names, since the time unit, though identified by the Washington Conference with the civil day of Greenwich, is equally related to all points on the earth's surface, in every latitude and longitude. For this time-unit a name is wanted.

Dr. Fleming suggested that a special committee be appointed to consider the subject. The suggestion

was adopted, and the committee made a report recommending that correspondence be opened, in the name of the Royal Society of Canada, with sister societies in other parts of the world with the view of bringing the subject to their notice, and asking the favor of an expression of opinion regarding it. The desired name is to be sought, by preference, in the classical languages.

The report of the committee was approved by the Royal Society of Canada at the general meeting held May 29, 1890.

It does not appear how the right name is to be chosen, at last; and, before this point can be settled, the term Universal Hour may have established itself in the minds of men.

RECENT CHARTS OF THE U. S. HYDROGRAPHIC OFFICE.

No. 1200.—Pennsylvania: Lake Erie, Erie Harbor.

No. 1205.—East India Archipelago: Singapore and Rhio Straits.

No. 1206.—Singapore New Harbor.

No. 1207.—Dominion of Canada: Quebec Harbor.

No. 1208.—Portugal: Approaches to the River Tagus and the Harbor of Lisbon.

No. 1215.—Flores Island, Rio de la Plata.

No. 1216.—Hawaiian Islands, with Islands and Reefs to the Westward.

No. 1217.—Gulf of St. Lawrence: Caraquette, Shippegan and Miscou Harbors, Bay of Chaleurs.

No. 1218.—Coasts of Peru and Chili: Pisco to Arica.

No. 1219.—Coast of Chili: Arica to Caldera.



- No. 1220.—Coast of Chili: Caldera to Valparaiso.  
No. 1221.—Samoa Islands: Upolu, Safatu Harbor.  
No. 1222.—Coasts of the Argentine Republic: Bahia Blanca to Rio Negro.  
No. 1223.—Gulf of California: Pichilingue Harbor (La Paz Bay).  
No. 1224.—Azores: Fayal Channel, with Horta and Pim Bays.  
No. 1225.—Gulf of Mexico: Laguna de Terminos, Western Entrance.  
No. 1226.—Bahamas: Wide Opening (Exuma Sound).  
No. 1227.—Bahamas: The Fleeming, or Six Shilling Channel (N. E. Providence Channel) and Ship Channel (Exuma Sound).  
No. 1228.—Gulf of Mexico: Laguna de Terminos, Puerto Real Entrance.  
No. 1229.—North America: Gulf of California, La Paz Harbor.  
No. 1230.—Philippines: Luzon Island, Manila Bay.  
No. 1231.—Island of Santo Domingo: Republic of Haïti, Cape Haïti Harbor.  
No. 1232.—Chili: Concon Cove.  
No. 1233.—Gulf of Mexico: Cay Arenas.  
No. 1234.—Gulf of Mexico: Arcas Cays, Campeche Bank.  
No. 1235.—Gulf of Mexico: Sisal Anchorage and Reefs.  
No. 1236.—Dominion of Canada: The Gut of Canso, with its Southern Approaches, and Chedabucto Bay.  
No. 1237.—Dominion of Canada, Cape Breton Island: Great and Little Bras d'Or Lakes, with their Approaches.

No. 1238.—South America, Guiana : Maroni and Mana Rivers.

BOUNDARY LINE BETWEEN NEW YORK AND NEW JERSEY IN LANDS UNDER WATER.—The Commissioners\* appointed by the States of New Jersey and New York, to establish the boundary line between the two States in the lands under water in Raritan Bay, Hudson River, Bay of New York, Kill von Kull and Arthur Kill, or Staten Island Sound, finished their task at the end of the year 1889, and the results arrived at are presented in two Reports, issued in 1887 and 1890 by the New Jersey Boundary Commission.

The agreement, finally adopted on the 12th of October, 1887, as to the lands under water in Raritan Bay, establishes the boundary line as follows :

*First.* From the "Great Beds light-house," in Raritan bay, north (twenty) 20 degrees sixteen minutes west, true, to a point in the middle of the waters of Arthur Kill or Staten Island Sound, equidistant between the south-westerly corner of the dwelling-house of David C. Butler, at Ward's Point, on Staten Island, in the State of New York, and the southeasterly corner of the brick building on the lands of Cortlandt L. Parker, at the intersection of the westerly line of Water Street with the northerly line of Lewis Street, in Perth Amboy, in the State of New Jersey.

*Second.* From "Great Beds light-house" south sixty-four degrees and twenty-one minutes east, true (S. 64°

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\*The Commissioners for New Jersey were : Robert C. Bacot, A. B. Stoney, and George H. Cook, who died Sept. 22, 1889. His place was filled by Col. Edwin A. Stevens. The New York Commissioners were : Mayo W. Hazeltine, Robert Moore and Lieut. G. C. Hanus, U. S. N.

21' E.), in line with the centre of Waackaack or Wilson's beacon, in Monmouth County, New Jersey, to a point at the intersection of said line with a line connecting "Morgan No. 2" Triangulation Point, U. S. Coast and Geodetic Survey, in Middlesex County, New Jersey, with the "Granite and Iron beacon," marked on the accompanying maps as "Romer stone beacon," situated on the "Dry Romer shoal"; and thence on a line bearing north, seventy-seven degrees and nine minutes east, true, (N.  $77^{\circ} 9'$  E.), connecting "Morgan No. 2" Triangulation Point, U. S. Coast and Geodetic Survey in Middlesex County, New Jersey, with said "Romer stone beacon" (the line passing through said beacon and continuing in the same direction) to a point at its intersection with a line drawn between the "Hook beacon," on Sandy Hook, New Jersey, and the Triangulation Point of the U. S. Geodetic Survey known as the Oriental Hotel, on Coney Island, New York; then southeasterly, at right angles with the last-mentioned line, to the main sea.

A second agreement, made on the 23d of December, 1889, settles the boundary line in lands under water in the Arthur Kill, Kill von Kull, New York Bay and the Hudson River, as follows:

Starting from a point (at the conclusion of the boundary line in Raritan Bay), and marked for the purposes of this Agreement, A.

This point is equi-distant between the southwesterly corner of the dwelling-house of David C. Butler, at Ward's Point, on Staten Island, in the State of New York, and the southeasterly corner of the brick building on the lands of Cortlandt L. Parker at the inter-

section of the westerly line of Water Street with the northerly line of Lewis Street, in Perth Amboy, in the State of New Jersey.

The line runs thence in a succession of straight lines through the Arthur Kill, the Kill von Kull, New York Bay and the Hudson River to a point marked "J J," for the purposes of this Agreement.

This point "J J" is at the extreme northern limit of the boundary line in lands under water, and from this point the line runs westerly to a rock which is described in the Report of the New York and New Jersey Boundary Commission of 1883 as marking the eastern end of the boundary line between New York and New Jersey as determined upon by the Royal Boundary Commission of 1769.

The absolute geographical locations of the point at the place of beginning and the point of conclusion are as follows :

*Point A* (place of beginning).

(Latitude and Longitude not given. Description sufficient.)

*Point JJ* (place of conclusion).

Latitude.	Seconds in Metres.	Longitude.	Seconds in Metres.
40° 59' 49".74 N.	1534.38.	74° 53' 38".57 W.	901.46

The labors of the Commissions have put an end to disputes, constantly renewed during two centuries.

GEOGRAPHICAL EXHIBITION.—The Department of Geography of the Brooklyn Institute opened in November a Permanent Exhibition of specimens of Text Books,

Maps, Globes, and other apparatus relating to geographical science and instruction.

The Exhibition, which is free to the public, is under the direction of Mr. Cyrus C. Adams, President of the Department of Geography in the Institute.

Mr. Adams has also taken editorial charge of a monthly magazine, to be published by Goldthwaite Brothers, of New York. The first number will appear in January, 1891.

EXPLORATIONS IN MEXICO.—Under this title, Prof. Angelo Heilprin has brought out in pamphlet form the barometric observations made among the high volcanoes of Mexico, by the expedition under his conduct, and has added a "Consideration of the Culminating Point of the North American Continent."

Four mountains were ascended—Orizaba, Popocatepetl, Ixtaccihuatl, and the Nevado de Toluca,—and Professor Heilprin says, with regard to his measurements: "The fact that all the summits were ascended within a period of three weeks (April 6-27, 1890), were measured with the same instrument, and during a period of atmospheric equability and stability which is offered to an unusual degree by a tropical dry season, renders the possibility of errors of any magnitude almost nil; at any rate, such errors as may have crept in will probably not affect a general comparative result. The points of important difference are: 1. The highest summit of Mexico is not, as is commonly supposed, Popocatepetl, but the Peak of Orizaba (Citlaltepetl, the "Star Mountain"), which rises 700 feet higher (18,200 feet); 2. Ixtaccihuatl, the familiar "White Woman" of the plain of

Anahuac, is but a few hundred feet (about 550) lower than Popocatepetl."

The data for the determination of the height are given, in the case of each mountain, and there seems to have been nothing left undone to arrive at a correct result; but it must be believed that accuracy in the measurement of a mountain is beyond the reach of science, when it is found that observers equally fitted for the work, and supposed to be equally careful in their methods, can only agree to differ.

Professor Heilprin's altitudes are: Orizaba, 18,205 feet; Popocatepetl, 17,523 feet; Ixtaccihuatl, 16,960 feet; and the Nevado de Toluca, 14,954 feet.

The "Consideration" is devoted to an examination of the claim of Mt. St. Elias to the first place among the high points of North America, and closes with these words: "That the mountain closely approximates the giants of the Mexican plateau is almost certain, but it seems equally probable that its true position is after, and not before, the Peak of Orizaba."

SALTILLO.—The London *Athenæum*, which has taken all knowledge for its province, frequently corrects its victims with incorrection.

In a review of a book, "Face to Face with the Mexicans," in the number for November 1, 1890, occurs this sentence:

"Mrs. Gooch, her husband, and two friends took a house in the city of Saltillo, which she might have said is also known as Leone Vicario."

It was, perhaps, because Mrs. Gooch had paid some attention to Spanish, that she did not think it proper



to bestow upon a Mexican city the Italian name of *Leone*; and her natural good sense must have told her that even the Spanish form, *Leon Vicario*, was not needed to identify the city of Saltillo.

The *Athenæum* would be wiser, if it did not know so much.

THE NICARAGUA CANAL.—The first number of the *Canal de Nicaragua*, a daily paper begun at Managua, Oct. 1, 1890, gives the following classified list of the persons employed in the operations on the Canal:

Engineering Department.....	7	Officers
Department of Supplies and Transportation.....	8	"
Paymaster's Department.....	3	"
<hr/>		
Study of the Bay....	4	Officers, 5 Men
Police .....	1	" 20 "
Storehouses.....	7	" 153 "
Carpenter Shops.....	1	" 40 "
Breakwater.....	16	" 140 "
Aqueduct.....	6	" 80 "
Diamond Drill.....	4	" 18 "
Transport Service.....	3	" 22 "
Location of the Rail Road.....	16	" 40 "
Cultivation.....		20 "
Telegraph.....	8	" 20 "
Crews of the Steamboats.....	8	" 16 "
Rail Road Construction.....	31	" 994 "
Medical Department .....	10	" 30 "
Sick.....	18	" 97 "
Western Division.....	8	" 25 "

159 Officers, 1720 Men

The *Canal de Nicaragua* makes the whole number 1849, instead of 1879.

THE WORD "TOBOGGAN."—Prof. W. W. Skeat writes to the *London Academy*, of November 8, 1890,

that he finds in the English-Micmac Dictionary,\* compiled by the late Dr. S. T. Rand, the true origin of the word *toboggan*. "The true Micmac form is," he says, "*tobaakun*, accented on *aa*, and meaning a sled or a sledge.

"After much hunting in many books, this is the first time I have ever lighted upon really good authority for this word."

This good authority spells the word *tôbákûn*, which ought to be classical Micmac, even for Professor Skeat.

PAPER FOR THE MAPS OF THE ORDNANCE SURVEY.—The *English Mechanic* publishes the following description of the care exercised in printing the Ordnance maps:

Captain C. E. Haynes, R. E., states that the large-scale maps of the Ordnance Survey are printed on double elephant machine-made drawing paper, the expansion of which, due to humidity, is greatest in its length.

Being a hard paper it is necessary to print from the zinc plate on damp sheets, which contract on drying, in length chiefly; consequently, the form on the plate should have a similar elongation. The negative is taken true to scale, and a photographic transfer prepared, after the Southampton method, on Evans' double elephant thin paper, which likewise has its greatest expansion in length.

Previous to transfer to zinc, the transfer is damped

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\*The title-page of the book is: "Dictionary of the Language of the Micmac Indians, who reside in Nova Scotia, New Brunswick, Prince Edward Island, Cape Breton and Newfoundland. By Rev. Silas Tertius Rand, D. D., L. L. D. (*Sic*). Halifax, N. S., : Nova Scotia Printing Company. 1888."

until it has expanded to a certain convenient length,—in practice, about  $\frac{1}{4}$  inch beyond its correct size—and quickly passed through the zincographic press; the scraping action of the press increases the length of the transfer by a slight variable amount, which can be determined by experiment. The printer then obtains a stock of paper for printing that has been damped to such a degree of expansion as will contract on drying to the correct scale. In the paper-damping department a stock of printing paper is kept sorted in various degrees of expansion to suit the variable sizes of form on the zinc plates. Every sheet of paper used for printing is measured before being damped, after being damped, and again after being printed. Prints with  $\frac{1}{100}$  or .16 per cent. of error in scale are cancelled. It is found that the elasticity of paper—*i. e.*, its capability of regaining its original form on drying after being damped—depends on its maturity, and that the maturity of a sheet depends on its age, and to a certain extent on its position in the ream.

MONT BLANC AND THE SOLAR SPECTRUM.—*Le Galilée*, for October, publishes an extract from a communication made, on the 22d of September, to the *Académie des Sciences*, by M. J. Janssen, the distinguished astronomer.

The observations recorded by M. Janssen in October, 1888, at the Grands Mulets, showed a diminution in the groups of lines in the spectrum in proportion to the elevation at which the observer stood; and this seemed to indicate that these groups would disappear at the limit of the atmosphere and that, consequently, their

appearance in the solar spectrum was not due to the action of the sun's atmosphere. To confirm or to correct these observations by others made at a greater height, M. Janssen, in August, 1890, went up to the top of Mont Blanc, and his experiments completed and confirmed those of 1888. He says: "The result of the observations made between the Eiffel tower and Meudon, those of M. de la Baume-Pluvinel at Candia, those in the laboratory, and finally, those of this year upon Mont Blanc, is that we are led to admit the absence of oxygen in the gaseous envelopes which surmount the photosphere of the sun; or at least, of oxygen so constituted as to exercise upon light the phenomena of absorption produced in our atmosphere, and expressed in the solar spectrum by the systems of lines and bands with which we are acquainted. I consider this to be a truth finally established, from which we may draw certain conclusions with regard to the constitution of the sun's atmosphere."

M. Janssen had noticed in himself, after climbing to the Grands Mulets in 1888, symptoms of fainting that came on with the effort at mental exercise, and these symptoms were only relieved by frequent long-drawn inspirations. The ascent to the summit of the mountain in 1890, was accomplished without bodily exertion, and the freedom from sickness and uneasiness was perfect during the four-days' stay at the top. The appetite was normal, and the intellectual faculties were entire, so long as no draft was made upon the physical strength. This experience possesses value for those who are charged with the conduct of scientific observations at great altitudes.

*Quatrième Congrès International de Navigation Intérieure, Manchester, 1890. La Navigation Intérieure en Espagne, par M. Andrés de Llauroadó, Ingénieur en Chef du District Forestier de Madrid.*

The navigable water-courses of Spain are : on the Mediterranean, the lower region of the Ebro ; on the Atlantic, those of the Tagus and the Douro, and the other important rivers that flow into the ocean ; and two canals, that of Castile, and the Imperial of Aragon.

The Canal of Castile, begun in 1753 and finished, after many interruptions, in 1849, has three branches : the Northern, 47 miles long from Alar to Serron ; the Southern, 34 miles long, from Serron to Valladolid, and the Canal de Campos, 49 miles long, from Serron to Rio Seco. This last is 38 feet wide at the surface of the water and 19 feet at the bottom, and has a depth of 9 feet 4 in.

There are 24 locks on the Northern branch, 18 on the Southern, and 7 on the Canal de Campos.

The Canal of Castile is used only for navigation, and transports annually about 20,000 tons of merchandise, a third of the amount that passed through it fifteen years ago, the railway system along the line of the canal having absorbed, with every year, a larger share of the traffic.

The Imperial Canal of Aragon, which was opened in 1790, begins at a point near the city of Tudela, and ends at Torrero, a short distance below Saragossa. From Torrero two short branches, with a total length of  $7\frac{1}{2}$  miles, lead to Miraflores and El Burgo. This canal has lost all its importance as a channel of commerce since the opening (in 1860) of the railway from Saragossa to Pampeluna.

Its chief value is for purposes of irrigation, and as a source of water supply to some towns.

A company, formed in 1851, for improving the navigation of the Ebro between Saragossa and the sea, pushed its work with great energy, and without sparing expense, until 1858, when the river was opened to steam navigation as far as Escatron, 42 miles below Saragossa. The character of the river bed and the deficiency of water made it impossible to do anything beyond Escatron, and the competition with the railroad lines from Saragossa to Absasua and to Pampeluna, from Barcelona to Saragossa, and from Lerida to Tarragona, caused the withdrawal of the steam service on the Ebro, and the utilization of the waters for irrigation became the sole resource of the company.

On the Guadalete the traffic is confined to about 4,000 tons yearly of wines, staves and shooks, and cereals, the railway from Xeres to Cadiz taking the lion's share of the trade.

The supply of water in the Guadalquivir and the slope of its valley (Thalweg) are unfavorable to navigation. The maritime region, which extends from the mouth of the river to the Tabla de las Playas, a little more than half a mile above Alcalá del Rio, is divided by Mr. de Llauradó into two sections; one, 43 miles long, from the Tabla de las Playas to the great bend of the river, and the other from the bend to the mouth, a distance of 33 miles. The influence of the tides is felt throughout the first section and the current of the river is arrested by the inflow.

In the second section, which is essentially maritime, the water is always salt. At Seville the tide rises from



5 to 8 feet, and the port, which is comprised between the Triana bridge and the Punta de los Remedios, has a depth of water of 20 feet at low tide, with a bottom of mud and sand. Four railway lines unite the port with the stations of the Cadiz and Cordova railroads. If Seville is no longer the centre of the colonial trade, its commerce is still considerable. In 1889 1,272 vessels, 494 of them steamers, with a total tonnage of 277,410, were entered and cleared at the Custom-house.

Mr. de Llauradó remarks that the creation of a maritime canal in the region of the lower Guadalquivir would furnish a sufficient depth of water for purposes of navigation and leave the fresh water of the river to be used for irrigation and the increase of production.

The river traffic of the Guadiana amounts to not more than 13,300 tons yearly; and the other two great rivers on the Atlantic side, the Tagus and the Douro, transport even a smaller quantity of merchandise. All the rivers of Spain are, in fact, torrential in character, and practically unavailable as means of communication, and it is by the railway system that the resources of the country must be developed. At a low stage of the river, the volume of water in the Tagus at Alcántara is represented by a flow of 20 cubic metres a second, but with the rapid freshets of the upper basin the river rises at the bridge of Alcántara to 36, 50, 65, and even 98 feet above low water. Equally remarkable are the freshets of the Nervion, at Bilbao, where the volume of water amounts at a low stage of the river to but 4 cubic metres a second, and increases in time of flood to 1,600 cubic metres.

A great part of Mr. de Llauradó's paper is devoted

to the commercial movement of the ports, situated on the estuaries of the Atlantic and the Biscayan coasts, and but indirectly concerned, therefore, with internal navigation. Of these there are more than 30, the most important being Huelva (near Palos, from which Columbus sailed), and Bilbao. Huelva is the emporium of the Rio Tinto copper-mines, and exports nearly 970,000 tons of ore yearly. In 1863 the total commerce of Bilbao was represented by 139,000 tons of imports, and 78,000 tons of exports; in 1888-89 (12 months) the imports and exports amounted to 4,459,972 tons, mostly exports of iron ore. The harbor of Bilbao has been deepened and improved in many ways under the direction of Mr. E. de Churruca, who is now engaged in constructing an outer harbor, which is to cover an area of more than a square mile. The work will cost \$6,000,000.

LAKE COPAIS.—The drainage of the Bæotian lake is now practically completed, the streams that flowed into it having been diverted, and the waters of the lake itself drawn off into the sea.

The area of the land reclaimed may be less than the 100,000 hectares (250,000 acres), at which it is put by the *Deutsche Rundschau für Geographie und Statistik*, XII. Jahrg., 12 Heft.; but it will make a great gain to the kingdom of Greece, and a loss to the lovers of eels.

*In Darkest Africa, or the Quest, Rescue, and Retreat of Emin, Governor of Equatoria. By Henry M. Stanley. 2 vols., 8vo.*

*New York, 1890.*

Stanley's book is like a controversial pamphlet, written in haste, and yet of intolerable length. The title seems to imply that the author regards himself as a Knight of the Round Table, but his true prototype is Pyrgopolinices, or Capt. Dugald Dalgetty. The impatience of the public to possess the book excuses much of the composition and, in a measure, some of the details; but, even with allowance for this, the story fatigues the reader. Stanley's interest in his own performances is not to be doubted, and this interest should communicate itself to other men; but few can resist the effect of his iteration. The charity, also, and the piety, which adorn the language, even more than the life, of Mr. Stanley, express themselves, like the notes of a street organ, in the least congenial places; and the reader, less spiritually minded than the Father of the Congo, finds himself lost in a maze of unrelated ideas. The pen-portraits, and descriptions of character, and the conversations reported lack deliberation and purpose, and add no real element to the work.

There is too much space devoted to the camp at Yambuya, and even the terrors of the Great Central African Forest seem to be exaggerated, though, in describing these, Stanley writes with an approach to naturalness and simplicity.

The geographical discoveries of the expedition were: the Great Forest, estimated by the explorer to cover more than 300,000 square miles; the Pygmies, the Ruwenzori mountains, and the Albert Edward lake.

It is to be regretted that Stanley was too much absorbed in his unselfish enterprise to remember that others had preceded him in the discovery of the Pygmies.

### *Geographical Notes.*

and the Ruwensori and the Great Forest. The marches through the Forest and the naming of the Albert Edward lake are his own, and he, alone among travellers, recognizes in the Pygmies the oldest aristocracy on earth; a clear injustice to the Cranes.

Not less than three hundred pages are devoted to Emin Pasha, his position and difficulties, the discussions with him, his irresolution and his ingratitude in refusing to be rescued; but the one page telling in plain English, why Stanley went to the Albert Nyanza, is not to be found.

*In Darkest Africa* is a record that shows once more its author's energy, his contempt of danger, and his fitness for the command of wild men, but it does not increase respect for his character.

EXTINCTION OF THE WHITE RHINOCEROS.—Mr. Selous, who has done a great deal of travelling and exploration in South Africa, expresses himself as follows, in the *London Field* of August 16th:

“It was within a mile of this spot that, two years previously, (*i. e.*, in 1883) I shot two white rhinoceroses (*Rhinoceros simus*), the last of their kind that have been killed (and perhaps, that *ever will be killed*) by an Englishman. They were male and female, and I preserved the skin of the head and the skull of the former for the South African Museum in Cape Town, where they now are. I shall never cease to regret that I did not preserve the entire skéleton for our own splendid Museum of Natural History at South Kensington; but when I shot the animal I made sure I should get finer specimens later on in the season. However, one

thing and another prevented my visiting the one spot of the country where I knew that a few were still to be found, and now those few have almost, if not quite all, been killed; and, to the best of my belief, the great white, or square-mouthed, rhinoceros, the largest of modern terrestrial animals after the elephant, is on the very verge of extinction, and in the next year or two will become absolutely extinct. If in the near future some student of natural history should wish to know what this extinct beast really was like, he will find nothing in all the museums of Europe and America to enlighten him upon the subject but some half-dozen skulls and a goodly number of the anterior horns." Mr. Selous stands, like Sir Bedivere

This way and that dividing the swift mind,

between grief for the extinction of the rhinoceros and sympathy with the student that is to be; but let him take comfort. He, at least, will live in a kind of history as the Englishman who bagged the last pair of white rhinoceroses, and wept the while, not as a rhinoceros weeps.

THE PACIFIC ON THE EAST COAST OF JAPAN.—Admiral Geo. E. Belknap, U. S. N., read a paper in October last, before the Asiatic Society of Japan, on "The Depth of the Pacific on the East Coast of Japan, with a Comparison of Other Oceanic Depths."

The subject of oceanic depths has been treated by Professor Dana, in the *American Journal of Science*, for March, 1889, but Admiral Belknap, who commanded the *Tuscarora* expedition in 1874, gives some interesting details of his own experience.

The *Tuscarora* left Yokohama in June, 1874, to survey a cable route from a point on the east coast of Japan on a great circle running through the Aleutian chain of islands, and ending at Cape Flattery at the entrance of Puget Sound. At 100 miles from the coast a sounding was made in 3,427 fathoms, the water having deepened more than 1,800 fathoms in a run of 30 miles.

The next cast was made in the Kuro Siwo, or Black Stream, and the wire broke when 4,643 fathoms had run out, without reaching bottom. The ship was headed in shore and the great circle was taken up again in latitude  $40^{\circ}$  N. Three successive casts of the lead within 80 miles gave 3,439, 3,587 and 3,507 fathoms. The next seven soundings at intervals of 40 miles apart showed 4,340, 4,356, 4,041, 4,234, 4,120, 4,411, and 4,655 fathoms. Considering these great depths, Admiral Belknap concluded that the great circle route would have to be abandoned, and search made for a new line.

He accordingly put back to Hakodate, and, starting again on the 30th of June, skirted the Kurile Islands as far as latitude  $48^{\circ}$ , and then laid a course for Agattu, in the Aleutian group.

It was found that the water deepened rapidly on this line also, a depth of 3,754 fathoms being reached 110 miles west of Cape Lopatka. Between this point and the Aleutian Islands a ridge rises to within 1,777 fathoms of the surface, with soundings of 4,037 fathoms at the eastern base of the ridge.

This series of soundings developed, therefore, a trough of extraordinary depth and extent along the eastern coast of Japan and the Kurile Islands and



proved the Kuro Siwo "to be of greater extent than any similar or approaching depression yet found in any other region of the great oceans."

From the great mass of data now brought together on the subject of oceanic depths, Admiral Belknap ventures to formulate with singular precision the proposition that, "*as a rule, the deepest water is found, not in the central parts of the great oceans, but near, or approximately near the land, whether of continental mass or island isolation.*"

A review of the work done shows that the *Tuscarora* found the first depths of 4,000 fathoms and approaching 5,000 fathoms; that the *Challenger* discovered the great depression of considerably more than 4,000 fathoms (4,475) in the bed of the North Pacific, near Guam; that the U. S. Coast Survey steamer *Blake* developed the 4,561 fathom depth in the North Atlantic, near Porto Rico, at a locality first indicated by the *Challenger's* soundings; and that H. M. Surveyingship *Egeria* found depths of 4,428, 4,295 and 4,530 fathoms, in 1888 and 1889, in the neighborhood of the Friendly and Cook Islands, in the South Pacific.

#### OBITUARY.

SIR RICHARD F. BURTON.—This famous traveller died at Trieste, on the 20th of October last, in the seventieth year of his age. He was born in Hertfordshire, England, on the 19th of March, 1821, and passed his early life on the continent. At the age of nineteen, he was entered at Trinity College, Oxford, but was rusticated after no long time, and then obtained a cadetship in the Indian army. In India, where he remained

for seven years, he devoted himself to the study of Oriental languages. He returned to England in 1849, and carried out in 1853 the dangerous enterprise of visiting Mecca and Medina in the disguise of a true believer. He next penetrated, in 1854, to the city of Harar, in Somaliland, and attempted to reach it again the following year, setting out with Lieutenant Speke from Berbera; but the party was attacked by night, and of the four Englishmen, only one, Lieutenant Herne, got back unhurt. Lieutenant Stroyan was killed, Burton received a javelin-thrust in the mouth, and Speke escaped as by a miracle, with unnumbered wounds from war-clubs and spears.

The journey to the lake regions of Central Africa, which resulted in the discovery of Lake Tanganyika, was undertaken in company with Speke in 1856, and extended over more than two years.

These three achievements—the pilgrimage to Mecca, the visit to Harar, which no other European had reached, and the discovery of Tanganyika—establish the right of Burton to a foremost place among explorers; and never was a man better equipped than he, with his force of character and his accomplishments, physical and intellectual, for the adventurous career he had chosen. He visited and described many portions of the Eastern Continent, as well as Brazil and Utah,\* in the New World, and his books show the man as he

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\* In the preface to *The City of the Saints* (1861), Burton frees his mind in a characteristic way concerning the "Anglo-Scandinavian" theory: "The word is proposed," he says, "by Dr. Norton Shaw, Secretary to the Royal Geographical Society, and should be generally adopted. Anglo-Saxon is to Anglo-Scandinavian what Indo-Germanic is to Indo-European; both serve to humour the absurd pretensions of claimants whose principal claim to distinction is pretentiousness."

was, a truthful, cool-headed, accurate observer, possessed of immense information.

His position as British Consul, first at Fernando Po, and afterwards in succession at the port of Santos, in Brazil, at Damascus, and at Trieste, afforded leisure for the composition of three works—a *Translation of Camoens*, *The Book of the Sword* (left unfinished), and the *Translation of the Arabian Nights*.

Burton had extraordinary qualifications for the work of the translator. He possessed the very idiom and the mode of thought, as well as the words, of the foreign peoples he had studied; and his rendering of Camoens, though it too often fails as poetry, is wonderful for closeness and accuracy.

His *Arabian Nights*, unreservedly praised by Orientalists, will remain a sealed book to most men, because of its plainness of speech and consequent high price, whenever a copy finds its way into a catalogue of works, pleasantly called *Facetia*. Burton was moved to undertake this translation—so he declared and undoubtedly believed—by the consideration that the study of the true *Arabian Nights* in English would enable his countrymen to understand the Mohammedan mind, and to deal more intelligently with the races that profess the faith of Islam.

To dispose of this consideration it is only necessary to ask one's self how far a person, not a genius, unacquainted with Greek or Latin, can enter into the spirit of the Greek or the Roman literature and life by the perusal of English translations of the classics.

There is no royal road to learning. Those who have it seriously at heart to know how Mohammedans live

and think must learn the Arabic language ; and this, *pace* Burton, very many of his countrymen have done and do.

The translation of the *Arabian Nights*, even more than his papers on anthropological subjects and many passages in his books of travel, bears testimony to the existence in Burton of a morbid proclivity, like that which marked the mind of Richard Payne Knight.

ANTONIO RAIMONDI.—Mr. Raimondi, a corresponding member of this Society since 1877, died in October last at Lima, in the sixty-fifth year of his age. A Milanese by birth, he had lived in Peru for forty years, devoting himself to the exploration of the country and the study of its geography, natural history and geology.

In 1873 he brought out a volume in quarto on the Department of Ancachs and Its Mineral Riches, the expense of publication being borne by Mr. Henry Meiggs ; and in 1874 appeared the first volume, entitled *Parte Preliminar*, of his great work, *El Perú*, the cost of which was assumed by the nation. This preliminary part describes the author's purpose and method, and tells the story of his journeys. The second and third volumes, issued respectively in 1876 and 1880, relate the history of geography in Peru from the days of Pizarro to the year 1878, and bear testimony throughout their 1,000 pages, to Mr. Raimondi's learning and sagacity and extraordinary industry. The progress of the war with Chile caused the suspension of the work after 1880, and it is, perhaps, unnecessary to believe, with Mr. C. R. Markham,\* that "among other wanton acts of vandalism

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\**Proceedings of the Royal Geographical Society*, December, 1890, pp. 764-765.

perpetrated by the Chilians, it is understood that a whole edition of the fourth volume of the work of Raimondi was destroyed."

*El Perú* did not wholly absorb its author's energies. A book on the minerals of Peru, prepared for the Paris Exposition, was published in 1878; and he made many contributions to scientific periodicals.

HERMANN BERGHAUS.—Mr. Justus Perthes, in a circular letter, dated December 3, gives information of the death of Hermann Berghaus on the morning of that day at Gotha.

The loss, so deeply felt by Mr. Berghaus's associates in the Institute at Gotha, is almost personal to every one who is interested in geographical science, but for him there is nothing to regret. His life-long labors for the enlightenment of mankind have been crowned by a peaceful death, in the fullness of time.

#### TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS,

EDINBURGH.—*The Scottish Geographical Magazine.*

The Physical Features of Brazil in their Relation to the Commercial and Industrial Development of the Country (by James W. Wells)—On the Present State of the Ordnance Survey and the Paramount Necessity for a Thorough Revision (by\* Henry T. Crook)—British Association, 1890: Report to Council (by A. Silva White). —The Partition of Africa (Arthur Silva White) —The Mapping of the World (John George Bartholomew)—Memorial of the Council of the Royal Scottish Geographical Society to

the Commissioners appointed by Parliament in the Universities (Scotland) Act, 1889—A Railway through Southern Persia (Maj.-Gen. Sir F. Goldsmid)—Spanish Honduras (Will Pilcher)—The Relief of Emin Pasha, A Review of Mr. Jephson's *Emin Pasha and the Rebellion at the Equator*.

GOTHA.—*Petermanns Mittheilungen*.

Involuntary Migrations in the Pacific Ocean—The Algerian Atlas Range—The New Limits in Africa—The Arabs on the Nile Lakes—The Report on the Present Position of the Panama Canal Company—The Beginning of the World and Geological Time—Avalanches in the Riesengebirge—Historical Development of the Knowledge of the Greenland Inland Ice—Plan of an Expedition to Eastern Greenland—Communications from North Borneo—Shorelines and Terraces—A Journey in German New Guinea—The Work on the Nicaragua Canal—The Question of the Many Years' Periods of Fluctuation in the Level of Bodies of Water—Hugo Zöller's Expedition to the Finisterre Mountains (German New Guinea)—On a Journey to the Eastern Slope of the Andes between the Rio Diamante and the Rio Negro (Argentine Republic)—The Borderland of Language in Schleswig—Brown's Travels in the Musgrave Mountains, South Australia—The Name of the Highest Mountain in the World—An Attempt to Sum up the Scientific Results of Stanley's March Through



Africa—The Molveno Lake in the Tyrol—Nordenskiöld's Fac-simile Atlas—The New Edition of Stieler's Hand-Atlas.

*Ergänzungsheft, Nr. 99.*

East Equatorial Africa, between Pangani and the Newly Discovered Rudolf Lake, by v. Höhnelt.

LISBON.—*Sociedade de Geographia de Lisboa.*

The Library : Part I., Printed Works—Publications.

LONDON.—*Royal Geographical Society, Proceedings.*

The Karun River and the Commercial Geography of Southwest Persia—Across Luristan to Isfahan—Lieut. H. B. Vaughan's Recent Journey in Eastern Persia—Notes on Yoruba and the Colony and Protectorate of Lagos, West Africa—Zambezia, the New British Possession in Central South Africa—The Partition of Africa—British Central Africa—A Journey from Lake Nyassa to the Great Loangwa and Upper Zambezi Rivers.

MADRID.—*Sociedad Geográfica, Boletín.*

The Paris Geographical Congress and Exhibition, in 1889—The Portuguese in South Africa and their Discovery of the Chambezi, the Source of the Congo, in 1796—The Polish Traveller Rogozinski, in Fernando Po—The Future of the Spanish Language (in comparison with the other principal tongues) from a Geographical and Statistical Point of View—The Cadastre in Spain—Rivers of Venezuela and Colombia : Unpublished Accounts Collected by Cesáreo Fernandez Duro—The Spanish Pyrenees—Note on Meteorological Work in Spain—A

New Map of the Zambezi (without date, but evidently made not long after 1610)—The Spanish Missions to Fernando Po and Its Dependencies.

PARIS.—*Société de Géographie, Compte Rendu.*

Climatology (the *Klima-Schwankungen* of Brückner)—Notes on European and Asiatic Russia—Bonvalot in Central Asia—Exploration of the Upper Yang-Tze—The Veddahs of Ceylon—Morocco—The Navigation of the Niger—Itinerary and Map of Fourneau's Mission from the Ogowe to El Campo—Vancouver, British Columbia—Exploration of the Valley of the Orinoco—Coudreau's Travels in Guiana—M. Thouar in South America—Exploration of the Pilcomayo—Rosario and the Development of its Port—The Arctic: Letters from Schwatka and Nordenskiöld—The Cliff Dwellers of the Sierra Madre—M. Cholet's Explorations in the Gaboon-Congo Region—M. Rabot's Travels in the Petchora Basin, the Northern Ural and Western Siberia—State of the Initial-Meridian Question—The Future of the Solid Earth—Letter concerning Captain Grombtchevsky's Travels in Central Asia—The Frontier between Tonkin and China—Map showing the Distribution of Wealth in France and the number of Children to the Family in each Department—Maps of the Parapanema and Itapetininga Rivers and of the Geology and Meteorology of S. Paulo, Brazil—Unification of the Hour and the Initial Meridian.

*Bulletin.*

Report on the Competition for the Annual Prize, 1890—The North African Routes to the Sudan—From Lima to Iquitos—The Resources of Central Asia as a Field for Russian Colonization—Notes on Tibet—The Telegraphic Conference at Paris on the Subject of the Universal Hour.

ROME.—*Società Geografica Italiana.*

Captain Casati at Rome—Itinerary in Somaliland—Area of the Inhabited Earth according to Strabo—The Italian Emigrant's Guide to Chile—Legend of the Jurupary—The Somali, Galla and Harari Spoken Tongues—Letter from Dr. Traversi—Two Excursions in the Dembelas Country (Ethiopia)—Ethnographic Study on the Population of the Caucasus.

VIENNA.—*Mittheilungen der Kais. Königl. Geographischen Gesellschaft.*

The Highland of Ulnia or Zeitun, (Eastern Cilicia)—The Southern Watering-Places on the Austrian Coast—The Subterranean Water-Courses of Carniola—The Panama Canal Company—The Profit of the Sumatra Coal Fields—The Date (Time Reckoning) in the Philippines.

WASHINGTON.—*National Geographic Magazine.*

The Arctic Cruise of the U. S. S. *Thetis* in the Summer and Autumn of 1889—The Law of Storms, Considered with Special Reference to the North Atlantic—The Irrigation Problem in Montana.

## WASHINGTON LETTER.

WASHINGTON, DECEMBER 20, 1890.

THE UNITED STATES CENSUS.—The population<sup>m</sup> of the United States (Alaska and whites in Indian Territory excepted), as finally determined, November 25,<sup>f</sup> is 62,622,250; a difference of 141,710 from the statement of October 28. The enumerations are :

### NORTH ATLANTIC DIVISION.

	1890.	1880.
Maine . . . . .	661,086	648,936
New Hampshire . . . . .	376,530	346,991
Vermont . . . . .	332,422	332,286
Massachusetts . . . . .	2,238,943	1,783,085
Rhode Island . . . . .	345,506	276,531
Connecticut . . . . .	746,258	622,700
New York . . . . .	5,997,853	5,082,871
New Jersey . . . . .	1,444,933	1,131,116
Pennsylvania . . . . .	5,258,014	4,282,891
	<hr/> 17,401,545	<hr/> 14,507,407

### SOUTH ATLANTIC DIVISION.

	1890.	1880.
Delaware . . . . .	168,493	146,608
Maryland . . . . .	1,042,390	934,943
Dist. of Columbia . . . . .	230,392	177,624
Virginia . . . . .	1,655,980	1,512,565
West Virginia . . . . .	762,794	618,457
North Carolina . . . . .	1,617,947	1,399,750
South Carolina . . . . .	1,151,149	995,577
Georgia . . . . .	1,837,353	1,542,180
Florida . . . . .	391,422	269,493
	<hr/> 8,857,960	<hr/> 7,597,197

## NORTHERN CENTRAL DIVISION.

	1890.	1880.
Ohio.....	3,672,306	3,198,062
Indiana..	2,193,404	1,978,301
Illinois.....	3,826,351	3,077,871
Michigan.....	2,093,889	1,636,937
Wisconsin.....	1,686,880	1,315,497
Minnesota.....	1,301,826	780,773
Iowa.....	1,911,896	1,624,615
Missouri.....	2,679,104	2,168,380
North Dakota.....	182,709	36,909
South Dakota.....	328,808	98,268
Nebraska.....	1,058,010	452,402
Kansas.....	1,427,096	996,096
	<hr/>	<hr/>
	22,362,279	17,364,111

## SOUTHERN CENTRAL DIVISION.

	1890.	1880.
Kentucky.....	1,858,635	1,648,690
Tennessee.....	1,767,518	1,542,359
Alabama ..	1,513,017	1,262,505
Mississippi.....	1,289,600	1,131,597
Louisiana.....	1,118,587	939,946
Texas .....	2,235,523	1,591,749
Indian Territory.....	.....	.....
Oklahoma.....	61,834	.....
Arkansas.....	1,128,179	802,525
	<hr/>	<hr/>
	10,972,893	8,919,371

## WESTERN DIVISION.

	1890.	1880.
Montana.....	132,159	39,159
Wyoming.....	60,705	20,789
Colorado.....	412,198	194,327
New Mexico.....	153,593	119,565
Arizona.....	59,620	40,440
Utah.....	207,905	143,963
Nevada ..	45,761	62,266
Idaho.....	84,385	32,610
Alaska.....	.....	.....
Washington.....	349,390	75,116
Oregon.....	313,767	174,768
California.....	1,208,130	864,694
	<hr/>	<hr/>
	3,027,613	1,767,697

Statistics are not yet available for exhibiting the sources of abnormal increment in some of the States.

The average increase of population in the north and south Atlantic divisions from 1880 to 1890 is 18 per cent. ; in the northern and southern central divisions, 25.65 per cent., and in the western division 70.22 per cent.; or, combining the northern and southern central with the western division, 40.52 per cent.

In the decade from 1870 to 1880 the average increase was: in the north and south Atlantic divisions, 23.87 per cent., in the northern and southern central divisions, 36.19 per cent., and in the western division, 78.46 per cent.; or, combining the three latter, 50.28 per cent.

The absolute increase of the population between 1880 and 1890 was 12,466,467, and the percentage of increase was 24.85. Between 1870 and 1880 the percentage of increase was 30.08. In explanation of this unfavorable, or, popularly speaking, disappointing showing, the Superintendent of the census claims that the census of 1870 was inaccurately taken in the southern States, and that the total population at that date was at least 40,000,000, instead of 38,558,371. Mr. Walker, who was Superintendent of the census of 1880, made a statement at the recent meeting of the National Academy of Sciences regarding the probable amount of error in the enumeration of the colored people of the South in 1870. From the best figures he could obtain, he said it was far from being 1,500,000 out of the way, or even a large proportion of that sum. By a series of computations he explained that the true figures would be between 5,200,000 and 5,400,000, instead of 4,880,000



as returned, and the probable error, therefore, between 320,000 or 520,000, instead of 1,500,000.

The relative rank and changes of rank from 1880 are as follows :

1890.	1880.
1. New York.	1. New York.
2. Pennsylvania.	2. Pennsylvania.
3. Illinois.	3. Ohio.
4. Ohio.	4. Illinois.
5. Missouri.	5. Missouri.
6. Massachusetts.	6. Indiana.
7. Texas.	7. Massachusetts.
8. Indiana.	8. Kentucky.
9. Michigan.	9. Michigan.
10. Iowa.	10. Iowa.
11. Kentucky.	11. Texas.
12. Georgia.	12. Tennessee.
13. Tennessee.	13. Georgia.
14. Wisconsin.	14. Virginia.
15. Virginia.	15. North Carolina.
16. North Carolina.	16. Wisconsin.
17. Alabama.	17. Alabama.
18. New Jersey.	18. Mississippi.
19. Kansas.	19. New Jersey.
20. Minnesota.	20. Kansas.
21. Mississippi.	21. South Carolina.
22. California.	22. Louisiana.
23. South Carolina.	23. Maryland.
24. Arkansas.	24. California.
25. Louisiana.	25. Arkansas.
26. Nebraska.	26. Minnesota.
27. Maryland.	27. Maine.
28. West Virginia.	28. Connecticut.
29. Connecticut.	29. West Virginia.
30. Maine.	30. Nebraska.
31. Colorado.	31. New Hampshire.
32. Florida.	32. Vermont.
33. New Hampshire.	33. Rhode Island.
34. Washington.	34. Florida.
35. Rhode Island.	35. Colorado.

1890.

36. Vermont.
37. South Dakota.
38. Oregon.
39. District of Columbia.
40. Utah.
41. North Dakota.
42. Delaware.
43. New Mexico.
44. Montana.
45. Idaho.
46. Oklahoma.
47. Wyoming.
48. Arizona.
49. Nevada.

1880.

36. District of Columbia.
37. Oregon.
38. Delaware.
39. Utah.
40. Dakota.
41. New Mexico.
42. Washington.
43. Nevada.
44. Arizona.
45. Montana.
46. Idaho.
47. Wyoming.

Seven States, viz.: New York, Pennsylvania, Missouri, Michigan, Iowa, Alabama and Wyoming retain the positions they had in 1880. The most marked changes are those of Texas, which rises from No. 11 to 7; Minnesota, from 27 to 20; Nebraska, from 30 to 26; Colorado, from 35 to 31; Washington, from 42 to 34; Vermont and Nevada drop six points each; Maryland, Delaware and Arizona, four each, and Kentucky, three.

The following table exhibits the rank of the thirteen original States in 1790 and 1890:

1790.

1. Virginia.
2. Pennsylvania.
3. North Carolina.
4. Massachusetts.
5. New York.
6. Maryland.
7. South Carolina.
8. Connecticut.
9. New Jersey.
10. New Hampshire.
11. Georgia.
12. Rhode Island.
13. Delaware.

1890.

15. Virginia.
2. Pennsylvania.
16. North Carolina.
6. Massachusetts.
1. New York.
27. Maryland.
23. South Carolina.
29. Connecticut.
18. New Jersey.
33. New Hampshire.
12. Georgia.
35. Rhode Island.
42. Delaware.

The work of establishing the population of the minor civil divisions of the country is well under way, and a Bulletin, containing the population of all cities and towns of 2,500 and over, is now in the hands of the printer. It will be followed immediately by a third Bulletin giving the population for each State in detail for all civil divisions of whatever size. It is stated that the returns will exhibit an unusual migration of the agricultural population to the cities, a gain in fact of no less than sixty per cent. in ten years.

Some of the most conspicuous features gathered by the eleventh census, and announced in preliminary statements, subject to final revision, deserve attention :

United States debt : The Government paid off \$999,141,205.15 of its debt in ten years, or more than one-half of the indebtedness as it existed in 1880. It now owes (Dec. 1, 1890) \$873,435,939.66—considerably less than the sum paid in ten years.

State debts : The States paid off debts to the amount of \$72,163,985.05 and now owe \$132,336,689.44, as against \$204,500,674.49 in 1880.

County debts have increased from \$125,621,455, in 1880, to \$145,693,840, in 1890 ; but sinking funds, cash and other available resources reduce that sum to \$115,224,885.

Municipal debts : The total of municipal debts in 1880 was \$695,494,741, and in 1890, \$745,919,786 ; but the sinking funds had increased from \$115,158,742 to \$147,181,191 ; 779 cities in 1880 reported debt in excess of resources amounting to \$502,267,198 ; in 1890, 746 cities reported \$469,788,951. But 112 cities reported resources of \$14,415,011 in excess of debt as against 79

cities reporting in 1880 \$1,116,239 in excess. The reduction in annual interest charges has been \$3,045,740. The rate of interest on municipal debts has fallen in the New England, Middle and Western States, and increased in the Southern States. Of the total debt, 96 per cent. is bonded.

Production: The production of pig-iron during the year ending June 30, 1890, aggregated 9,579,779 tons (of 2,000 pounds) as compared with 3,781,021 tons produced in 1879-80, and 2,052,821 in 1869-70. The Southern States produced 1,780,909 tons of the 1889-90 aggregate, of which one half came from Alabama. The United States is probably to day the leading producer of pig-iron in the world. The total production of steel in the form of ingots and direct castings aggregates 4,466,926 tons in 1889-90 as against 1,145,711 tons in 1879-80. The production of Bessemer steel rails has increased in the same period from 741,475 to 2,036,654 tons. There are steel works in nineteen States, Pennsylvania continuing to occupy the position of leading producer, with 62 per cent. of the product. Illinois is second in rank, and Ohio, third; although the increase in the latter State nearly equalled that of Pennsylvania. Steel manufacture has been abandoned in Rhode Island and Vermont.

In the case of the following industries special reports will be made by expert special agents charged with this duty as noted in each case:

Chemical industry, Henry Bower, of Philadelphia, Pa.

Clay and pottery products, Henry T. Cook, of Trenton, N. J.

Coke and glass, Joseph D. Weeks, of Pittsburgh, Pa.

Cotton goods, Edward Stanwood, of Boston, Mass.

Distilled spirits used in the arts, manufactures and in medicine, Henry Bower, of Philadelphia, Pa.

Electrical apparatus and appliances, their manufacture and uses, Allen R. Foote, of Washington, D. C.

Manufactured gas, George W. Graeff, Jr., of Philadelphia, Pa.

Iron and steel, William M. Sweet, of Philadelphia, Pa.

Mixed textiles, Peter T. Wood, of Newark, N. J.

Printing, publishing, and periodical press, S. D. N. North, of Boston, Mass.

Salt, Henry Bower, of Philadelphia, Pa.

Ship-building, Charles E. Taft of Little Rock, Ark.

Silk and silk goods, Byron Rose, of New York City.

Wool and worsted, S. D. N. North, of Boston, Mass.

The following is a list of those in charge of the general divisions of the census work :

Geography, Henry Gannett.

Population, William C. Hunt.

Vital statistics, Dr. John S. Billings.

Church statistics, Dr. Henry K. Carroll.

Educational statistics, James N. Blodgett.

Pauperism and crime, Rev. Fred. N. Wines.

Wealth, debt and taxation, T. Campbell-Copeland.

National and State finances, J. K. Upton.

Farms, homes and mortgages, George K. Holmes, John S. Lord, and John D. Leland.

Agriculture, John Hyde and Mortimer Whitehead.

Manufactures, Frank R. Williams.

Mines and mining, David T. Day.

Fish and fisheries, Charles W. Smiley.

Transportation, Prof. Henry C. Adams.

Insurance, Charles A. Jenney.

Statistics of special classes, Dr. John S. Billings.

Alaska, Ivan Petroff.

Statistics of Indians, Thomas Donaldson.

Social statistics of cities, Harry Tiffany.

Accounts of farms, homes and mortgages, Charles L. Curtiss.

It is the intention to publish, in connection with the census volumes, a new Statistical Atlas of the United States, which shall show by a series of maps and diagrams not only the progress of the country for the last decade, but for the century.

The report on Vital Statistics bids fair to be of more value to the country and to scientific inquiry than any heretofore prepared. The Superintendent says: "By far the greater portion of the work has been upon special inquiries outside the census year, but of the highest importance and value, consisting in part of the collection of data from the records of local boards of health during the five years immediately preceding the census year. The places selected for this inquiry were the cities of Baltimore, Boston, Brooklyn, Chicago, Cincinnati, New York, Philadelphia, St. Louis, the District of Columbia, and the whole of New Jersey."

A special inquiry of the Vital Statistics division concerns matters relating to Hebrew families throughout the United States.

Another special investigation decided upon is in the line of horticulture, including nurseries, florists, and



farms, truck farms and semi-tropic fruits; also, a census of farmers' organizations. It is thought that this enumeration will account for at least twenty-five thousand organizations.

The publications of the Census Office for general distribution consist thus far of a series of *Bulletins*, in semi-quarto form, which are best described by citing their titles, viz.:

No. 1. Feb. 10, 1890. List of supervisors' districts.

“ 2. Dec. 20, 1889. List of aquatic animals which are sought by fishermen. (The office has published also a dictionary of fishes, prepared by Mr. C. W. Smiley.)

“ 3. March 1, 1890. List of industries, the collection of the statistics of which has been withdrawn from enumerators, and assigned to experts.

“ 4. April 23. Names and addresses of supervisors.

“ 5. May 15. Statement of the character of the inquiries in relation to recorded indebtedness of private individuals and corporations.

“ 6. Aug. 4. Financial condition of counties, by T. Campbell-Copeland. (With symbolic maps to illustrate the geographical distribution of county debt and available resources.)

“ 7. Aug. 6. Indebtedness of States in 1880 and 1890, by J. K. Upton.

“ 8. Aug. 8. Product and value of Slate Mining, by Wm. C. Day.

“ 9. Aug. 20. Production of Pig-iron, by Frank R. Williams.

“ 10. Aug. 22. Statistics of Quicksilver, by J. B. Randall.

- “ 11. Aug. 23. Rapid Transit in Cities, by Charles H. Cooley.
- “ 12. Oct. 30. Population of the United States, by States and Territories.
- “ 13. Oct. 31. Production of Steel, by William M. Sweet.
- “ 14. Nov. 4. Financial Condition of Municipalities, by T. Campbell-Copeland.
- “ 15. Nov. 7. Progress Report on the Census of Alaska, by Ivan Petroff.

PAN-AMERICAN CONFERENCE :—*Results.* Among the recommendations of the recent Conference of American Republics, was the following :

Resolved : That the Governments here represented shall unite for the establishment of an American International Bureau, for the collection, tabulation, and publication, in the English, Spanish, and Portuguese languages, of information as to the productions and commerce, and as to the customs, laws, and regulations of their respective countries ; such bureau to be maintained in one of the countries for the common benefit and at the common expense, and to furnish to all the other countries such commercial statistics and other useful information as may be contributed to it by any of the American republics. That the Committee on Customs regulations be authorized and instructed to furnish to the Conference a plan of organization and a scheme for the practical work of the proposed bureau.

In accordance with this resolution the committee, which consisted of Messrs. José Alfonso, M. Romero, N. Bolet Peraza, Salvador de Mendonça, H. G. Davis and Charles R. Flint, submitted a series of recommen-

dations. Among others: That the countries represented shall form an association under the title of "The International Union of American Republics for the prompt collection and distribution of commercial information." That the International Union shall be represented by a bureau in Washington, under the supervision of the Secretary of State. That this bureau shall be called "The Commercial Bureau of the American Republics," and that its organ shall be a publication to be entitled "Bulletin of the Commercial Bureau of the American Republics." That the contents of the Bulletin shall consist of existing customs tariffs; regulations affecting the entrance and clearance of vessels and the importation and exportation of merchandise; quotations from commercial and parcel-post treaties; statistics of external commerce and domestic products. That the Bureau shall at all times be available as a medium of communication for persons applying for reasonable information in regard to customs tariffs and regulations, and to the commerce and navigation of the American republics. That the expense of maintaining the Bureau shall be borne proportionately by the several Governments represented in the Union, the first assessment being as follows:

Countries.	Population.	Tax.	Countries.	Population.	Tax.
Hayti.....	500,000	\$187.50	Honduras.....	350,000	\$131.25
Nicaragua.....	200,000	75.00	Mexico.....	10,400,000	3,900.00
Peru.....	2,600,000	975.00	Bolivia.....	1,200,000	450.00
Guatemala.....	1,400,000	525.00	United States...	50,150,000	18,806.25
Uruguay.....	600,000	225.00	Venezuela.....	2,200,000	825.00
Colombia.....	3,900,000	1,462.50	Chili.....	2,500,000	937.50
Argentina.....	3,900,000	1,462.50	Salvador.....	650,000	243.75
Costa Rica.....	200,000	75.00	Ecuador.....	1,000,000	375.00
Paraguay.....	250,000	93.75			
Brazil.....	14,000,000	5,250.00	Total.....	96,000,000	36,000.00

That modifications of plans may be made by the vote of a majority of the members of the Union ; and finally that the Union shall continue in force during ten years, and thereafter for successive period of ten years each, unless, twelve months before the expiration of any ten years' period, a majority of members officially notify the Secretary of State of their wish to terminate it.

In pursuance of these recommendations of the Conference the following appropriation was agreed to at the last session of Congress :

For the organization and establishment, under the direction of the Secretary of State, of " The International Union of American Republics for the prompt collection and distribution of commercial information," thirty-six thousand dollars, and the sums contributed by other American Republics for this purpose, when collected, shall be covered into the Treasury.

The Secretary of State has already organized the Commercial Bureau of American Republics in accordance with the recommendations of the Conference. Mr. William E. Curtiss is director, assisted by Dr. José I. Rodrigues, Carlos Federico Adams Michelena, Ricardo Villafranca, and J. C. Redmon. Headquarters at 2 Lafayette Square, Washington, D. C. The Bureau is now preparing (1) a glossary of commercial terms that have different meanings in different countries. It will contain all the equivocal names with their local synonyms in parallel columns ; in all, about 8,000 words ; (2) a compilation of the tariffs of American Republics by articles ; (3) a series of Bulletins in three languages, containing sketches of the staples of these countries, some account of the articles of merchandise

which they import, and others of which they stand in need.

Another recommendation of the Conference which, to the extent of consideration at least, received the approval of Congress, is the establishment of an international American monetary union, and as a basis of this union an international coin or coins of uniform weight and fineness, which may be used in all the countries represented in the Conference. The opinion was declared and adopted that great advantages would accrue to the commerce between the nations of this continent by the use of a coin or coins that would be current at the same value in all the countries represented, and that to give effect to this recommendation a commission composed of one delegate or more from each nation represented should meet in Washington to consider the quantity, the kind of currency, the uses it shall have, and the value and proportion of the international silver coin or coins, and their relations to gold.

Congress authorized the President to invite the governments of the several American republics and the Hawaiian kingdom to send delegates, and also to appoint three to represent the United States in the Commission. The latter have not yet been appointed. This Monetary Union will assemble in Washington on the first Wednesday of January next. The sum of fifteen thousand dollars has been appropriated to pay expenses.

Still another recommendation of the Conference which has been sanctioned by Congress, is the project for a preliminary survey of a route for an inter-continental line of railroad to connect the systems of North America with those of the Southern continent, to be con-

ducted under the direction of a board of commissioners representing the several American republics; the expense to be shared by the several nations of the hemisphere in proportion to their respective populations. The proportion to be borne by the United States is found to be \$65,000; which amount Congress appropriated, and at the same time authorized the President to appoint three members of the "Continental Railway Commission" to represent the United States. The commissioners appointed are Alexander J. Cassatt of Pennsylvania, George M. Pullman of Illinois, and Henry G. Davis of West Virginia. Headquarters at Washington. A meeting for organization was called for December 4th.

The fundamental idea of this undertaking is, that in order to develop the growth of material interests, there should be a railroad connecting all the nations of the American continent. That the railroad should connect the principal cities lying in the vicinity of its route, and by branch lines, when cities are not on the direct line.

As is already well known, existing railways will be utilized as far as practicable. Where the results of a survey demonstrate the advisability of a railroad, proposals for construction may be solicited, such construction, as well as the management and operation of the line, to be at the expense of the concessionaires. It has been stated that the complete development of this undertaking is no more formidable than was the construction of the railways to the Pacific across the North American continent.

Mr. George H. Coryell, a well-known civil engineer, says that the talk of a road along the Caribbean sea,



down through the eastern part of Yucatan, Honduras, Nicaragua, and to Costa Rica is all wrong. The shortest, most economical, and in every way most desirable route is along the foot-hills of the great mountain chain that lies but a short distance back from the Pacific coast. This route would also touch most of the principal cities, and the cost of construction would be much less than would be spent in the other plan. Along the eastern coast the country for nearly the whole distance, for miles back from the sea, is swampy and pestilential. From Mexico to Tehuantepec, according to Mr. Coryell, where the line runs through the Sierra Madre mountains, is the only portion of the route where any heavy work will be required. The Mexican Government is already at work on a line from Mexico to Oaxaca, two-thirds of the distance from Mexico to Tehuantepec, and this will leave about 125 miles of road to be constructed from Oaxaca to Tehuantepec. The rest of the distance down from the isthmus into South America, where it is designed to connect with South American republics' system is comparatively plain sailing. The distance is about 1,400 miles, and the estimated cost of building the road is \$10,000,000.

The most important political question unfolded by the Conference would seem to be that of reciprocity. The discussion of this question in and out of Congress, following the memorable letter of the Secretary of State, is so recent and familiar that it need only be referred to here as the key to certain legislation which was engrafted on the recently enacted tariff. *Section 3* provides: "That with a view to secure reciprocal trade with countries producing the following articles, and for

this purpose, on and after January 1, 1892, whenever, and so often as the President shall be satisfied that the government of any country producing and exporting sugar, molasses, coffee, tea, and hides, raw and uncured, or any of such articles, imposes duties or other exactions upon the agricultural or other products of the United States, which in view of the free introduction of such sugar, molasses, coffee, tea, and hides into the United States he may deem to be reciprocally unequal and unreasonable, he shall have the power, and it shall be his duty to suspend, by proclamation to that effect, the provisions of this act relating to the free introduction of sugar, molasses, coffee, tea, and hides, the production of such country, for such time as he shall deem just, and in such case and during such suspension duties shall be levied, collected and paid upon sugar, molasses, coffee, tea, and hides, the product of or exported from such designated country as follows" (a list of duties to be imposed).

It is stated in the letter of the Secretary of State (Sen. Ex. Doc. No. 158, 51st Cong., 1st. sess.) that fifteen of the seventeen republics with which we have been in conference have indicated their desire to enter upon reciprocal commercial relations with the United States; the remaining two expressing equal willingness, could they be assured that their advances would be favorably considered.

A NEW MARINE BOARD.—The late International Marine Conference discussed the following resolution:

*Resolved:* That the Conference recommends that the advisability of a Bureau of Maritime Information should be considered by the governments of the maritime nations.

The understanding was, that the proposed bureau should consider and recommend for experiment all apparatus and appliances for marine use ; such as life-saving appliances, systems of running lights, sound signals, etc.

After a discussion lasting somewhat over a day and a half, it was decided not to recommend the establishment of such a bureau ; and the reason for the non-support of the measure was the fact that most of the Great Powers have already bureaus of this nature.

But the delegation of the United States voting in the affirmative on this resolution, thereupon in order to provide for the discharge of such functions in this country recommended, "that immediate steps be taken for the establishment, with headquarters at Washington, of a Board to have charge and general superintendence of matters relating to merchant vessels and seamen ; said Board to be under the Treasury Department, and to be composed of the Supervising Inspector of steam-vessels, the Commissioner of Navigation, the Surgeon-General of the Marine Hospital Service, the Superintendent of the Life-Saving Service, two Navy officers, five experts, and an Admiralty lawyer\* ; the idea being to combine into one board the several bureaus now charged with the execution of duties relating to marine affairs ; thereby securing unity of action and efficient results without loss of energy resulting from separate effort by different bureaus on the same matters.

The reasons which constrained the American delegates to make this recommendation are so unfamiliar, if not indeed startling, that they abundantly substantiate

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\*Proceedings Internat. Marine Conference, Vol. 3, p. 495.

their conclusions as well as the subsequent action of the Treasury Department. They said: "While the laws regarding the Government inspection of *steam-vessels* may be assumed to insure upon them the necessary security of life and property at sea so far as strength of the vessels, proper equipment, etc., are concerned, no such provisions exist by law with regard to sailing vessels. A totally unseaworthy sailing vessel may put to sea at the risk of all lives and property on board: furthermore, she may be overladen and utterly deficient in necessary equipment for the safety of her crew and passengers in case of accident, such as boats, life-rafts, life-preservers, pumps, etc., or fire extinguishing apparatus. This condition of things exists, notwithstanding the fact that the number of sailing vessels belonging to the United States is nearly three times as great as the number of steamers, and the tonnage of sailing craft exceeds that of steamers by more than 300,000 tons. The number of casualties occurring to sailing vessels during 1888, was twice as great as those occurring to steamers, and the lives lost on board sailing vessels were three times as many as those lost on board steamers, although the majority of passengers are carried on board steamers.\*

The recommendation of the American delegates was brought more directly to the attention of the Executive Departments by the action of Congress in passing at the last session a concurrent resolution directing "the Secretary of State, the Secretary of the Treasury, the Secretary of War, and the Secretary of the Navy to examine the report and resolutions of the dele

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\* Proceedings Internat. Marine Conference, vol. 3, p. 496.

gates of the United States in the late International Marine Conference, and to prepare and submit to Congress bills for the enactment into law of said resolutions."

Thereupon the acting Secretary of the Treasury (Mr. Spalding) in behalf of that department constituted and appointed a committee of Treasury officials to consider the recommendations. The committee organized, and invited in conference, representatives of different marine interests.

Mr. Goodrich, representing the Maritime Association, spoke in favor of organizing a board of trade or commerce, such as has been established by Great Britain. His reason for this was that all the bureaus of this Government relating to the merchant marine were scattered through the various departments and worked separately. . He favored bringing them together under one head. President Miller, representing the National Board of Steamboat Navigation, favored such a board. Mr. Mink, chairman of the same association, suggested that the water interests of the United States be harmonized in a committee, not permanent, but subject to the call of the Treasury Committee, to be composed of the several heads of marine bureaus of the Government and six experts in marine affairs. Mr. Mosley of the Atlantic Marine Insurance Company of New York, and Mr. Lyle of the Ohio and Mississippi River Navigation Company, concurred in these views. Mr. Edmunds, representing the Vessel Owners and Captains' Association, opposed the establishment of the proposed board unless the majority of its members were sailing men. Mr. Lawrence of the same association favored the

establishment of the board proposed. Mr. Cook, of the Vessel Owners and Captains' Association, wanted the board to be composed entirely of officers of the Government. Dr. Hamilton, of the Marine Hospital Service, suggested that the board be composed of Government officers alone and that they call upon outsiders for information (as was being done at present) whenever they wished, and that those called be allowed per diem and travelling expenses. This suggestion met with general approval. Mr. Goodrich proposed that a committee draft a bill to be submitted to the different marine associations for their opinion.

The committee subsequently submitted a report to the Secretary of the Treasury, with a draft of a bill to be submitted to Congress. The committee did not agree with the recommendations of the Marine Conference delegates that five members of the Board should be experts in matters relating to the merchant marine, and that an admiralty lawyer, etc., should be *ex-officio* member. The bill provides that there shall be in the Department of the Treasury a Marine Board, which shall consist of one of the Assistant Secretaries of the Treasury, to be designated by the Secretary of the Treasury, who shall be *ex-officio* chairman of the Board, and the following officers, who shall be *ex-officio* members : The chairman of the Light-House Board, the Supervising Inspector-General of Steam-vessels, the Surgeon-General of the Marine Hospital Service, the General Superintendent of the Life-Saving Service, the Commissioner of Navigation, the Superintendent of the Coast and Geodetic Survey, the Chief Hydrographer of the Navy. These offices are now held respectively by Rear-Admiral



David B. Harmony, James A. Dumont, Dr. John B. Hamilton, Sumner I. Kimball, William Bates, Thomas C. Mendenhall, and Lieut. Richardson Clover, Acting Hydrographer.

None of the members of the board shall receive any additional compensation by reason of any services performed under the act, but shall receive mileage at the rate of eight cents per mile when travelling under official orders. The board is to meet for organization within sixty days from the passage of the act, and thereafter quarterly, and at such other times as the Secretary shall direct for joint consultation and recommendation to the Secretary of the Treasury, for presentation by him to Congress of any changes in existing laws, or enactment of new ones, as in their judgment may seem necessary for the protection of the interests of the Government, and the benefit and improvement of the merchant marine, or for the relief of the merchant marine from any illegal, harsh, or unreasonable laws operating to its detriment, and for the transaction of any other business that may properly come before it. The board may, for its information and use, take the examination, or receive the statements in writing of persons of practical knowledge and experience in the building, repairing and navigation of vessels, and in the business management of the merchant marine of the United States, and of the authorized representatives of all organized bodies connected therewith; it shall have supervision of all laws affecting the merchant marine not assigned by law to any other branch or bureau of the Government, and the Secretary of the Treasury shall upon the recommendation of the board, if he approves, assign to either of the

bureaus, or offices under the charge of either of the *ex-officio* members of the board, the execution of any provisions of law relating to the merchant marine not otherwise assigned. The board shall collect all information and intelligence available affecting maritime interests, and from time to time shall publish for the benefit of the Government and of the merchant marine so much of the same as shall be deemed useful ; and all officers of the Government having in their possession at any time such information are directed to furnish the same to the Marine Board when not incompatible with the public interests.

UNITED STATES BOARD ON GEOGRAPHIC NAMES.—The circumstances which gave rise to this Board and the details of its organization were quite minutely stated in my Letters of July and October last. Professor Mendenhall, the Chairman of the Board, in a prefatory note to the first Bulletin gives some additional data, which are sufficiently interesting to recite here in order to explain more fully the careful and critical examination of the questions with which the Board has to deal. He says : “ In disposing of any question which is brought to the attention of the Board the following plan is pursued : It is first referred to the Executive Committee, consisting at present of Mr. Henry Gannett of the U. S. Geological Survey, Lieut. Richardson Clover, U. S. Navy, and Mr. Herbert G. Ogden, U. S. Coast and Geodetic Survey. This committee is charged with the thorough investigation of the question, and is expected to consult all known authorities and to make use of such assistance as it may find anywhere available. A *résumé* of the results of such investigations, together with a recom-

mendation, is made to the Board at a regular meeting, and after discussion the decision is reached by a vote." He says further: "The Board is already greatly indebted to several correspondents for aid in reaching the decisions published in this Bulletin, notably in the case of the long list of Alaska names, concerning which most of the best authorities on Alaska in this country have been consulted. It desires to continue to receive the assistance of all geographers, historians, and other scholars interested in geographic nomenclature, and will be pleased to receive communications from such at any time. While it cannot hope to be infallible in its decisions, it trusts that with such assistance its mistakes may be few, and that it may succeed in bringing to orderly uniformity the great confusion in nomenclature which now exists in government publications. Although its functions are purely those of a Government Board, and its decisions binding on Government officers only, it may not be improper to express a hope that they may also be followed by the public in general, especially the map and text-book publishers, and to this end copies of the bulletins, which will be issued from time to time as occasion demands, will be sent, as far as possible, to all requesting them."

Lieut. Richardson Clover, Hydrographic Office, Navy Department, is the Secretary of the Board, to whom all communications may be addressed.

The following principles have been adopted by the Board for guidance in determining the official form or rendering of geographical names.

1. That spelling and pronunciation which is sanctioned by local usage should in general be adopted.

2. Where names have been changed or corrupted, and such changes or corruptions have become established by local usage, it is not in general advisable to attempt to restore the original form.

3. In cases where what was evidently originally the same word appears with various spellings sanctioned by local usage ; when applied to different features, these various spellings should be regarded as in effect different names, and that, as a rule, it is inadvisable to attempt to produce uniformity.

4. When a choice is offered between two names or more for the same place or locality, all sanctioned by local usage, that which is most appropriate and euphonious should be adopted.

5. The possessive form should be avoided, whenever it can be done without destroying the euphony of the name or changing its descriptive application.

6. Geographic names in countries that use the Roman character should be rendered in the form adopted by the country having jurisdiction, except when there are English equivalents already fixed by usage. In cases where the English equivalent is so different from the national form, that the identity of the latter with the former might not be recognized, both forms may be given.

7. The spelling of geographic names that require transliteration into Roman characters should represent the principal sounds of the word as pronounced in the native tongue, in accordance with the sounds of the letters in the following system. An approximation only to the true sound is aimed at in this system. The vowels are to be pronounced as in Italian and on the con-

continent of Europe generally, and consonants as in English (Table of Letters, Sounds, and Examples omitted).

Appended is a list of some of the decisions of the Board extracted, from Bulletin No. 1, dated December, 1890.

*Note*:—Names adopted in HEAVY FACE lower case type, the discarded form in *italics*.

**Akun**, Alaska. *Akhun, Akoun, Akan.*

**Alaska Peninsula**. *Aliaska, Aliashka.*

**Amchitka Island**, Alaska. *Amitkhitka, Amtchitka.*

**Amukta Island**, Alaska. *Amoughta, Amoukhta, Amuchta.*

**Anacostia River**, District of Columbia. *Eastern Branch.*

**Andreafski Fort**, on Yukon River, Alaska. *Andreiefski, Andreivsky, Andreaivsky.*

**Andreanof Islands**, Aleutian Islands, Alaska. *Andreanov, Andreanowsky.*

**Aniak-chak Bay**, East side Alaska Peninsula. *Aniakcha.*

**Annobon**, Island in Gulf of Guinea, West Africa. *Annabon, Anno Bon, Anno Bom.*

**Assini**, West Africa. *Assinie, Assinia.*

**Attu Island**, Alaska. *Attoo, Atton.*

**Augustine Island**, North of Cape Douglas, East Coast of Alaska Peninsula. *Augustin, Chernaboura.*

**Baluchistan**, India. *Beloohistan, Belouchistan, Baloachistan, Belutchistan.*

**Barbados Island**. In West Indies. *Barbadocs.*

**Barstow Rock**, Coast of Massachusetts. *Barstows Rock, Barslow.*

**Becharof Lake**, Alaska Peninsula. *Botcharoff, Bochonoff, Rochanoff.*

**Bering Sea**, Alaska. *Behring, Behrings.*

**Big Diomedede Island**, In Bering Strait. *Ratmanoff, Ratmanof, Noo nar-book.*

**Bogoslof Island**, West of Unalaska. *Bogoslov.*

**Buckland River**, into Kotzebue Sound, Alaska. *Kunguk.*

**Buen Ayre**, Island in Caribbean Sea. *Bonaire.*

**Chile**, South America. *Chili.*

**Chilkat**, River and Pass, Alaska. *Chilcat.*

**Chilkoot**, Village and Pass, Alaska. *Chilkut.*

**Chiniak Bay**, North-east of Kadiak, Alaska. *Chiniatskov.*

**Dall Point**, south of Cape Romanzof. *Cape Dall.*

**Deadman Point**, Maine. *Deadman's Point.*

**Fiji Islands**, South Pacific. *Feejee, Viti, Fidschi.*

**Guadeloupe Island**, West Indies. *Gaudeloupe.*

**Haiti**, Republic in West Indies. *Hayti.*

**Helgoland**, Island in North Sea. *Heligoland.*

**Hudson Bay**, Canada. *Hudson's Bay.*

**Isla de Pinos**, West Indies. *Isle of Pines, Pinos Island.*

**Kadiak Island**, Alaska. *Kodiak.*

**Kongo**, River and State, West Africa. *Congo.*

**Little Diomedede Island**, Alaska. *Igna-look, Kru-senstern.*

**Lynn Canal**, Alaska. *Lynn Channel.*

**Magdalen Island**, Hudson River. *Slippe Stein.*

**Oudh**, British India. *Oude.*

**Point Arena**, Coast of Chili. *Punta Arenas.*

**Pribilof Island**, Alaska. *Pribyloff.*

**Puerto Rico**, Island in West Indies. *Porto Rico.*

**Saint Croix**, Island and Town, West Indies. *Santa Cruz.*



**Salvador**, Central America. *San Salvador.*

**Sorrento Harbor**, Coast of Maine. *Point Harbor.*

**Stikine River**, Alaska. *Stikeen.*

**Unalaska Island**, Alaska.. *Ounalashka, Unalashka, Oonalaska, Ooanalashka.*

The Bulletin contains a list of two hundred and twenty-six corrected names.

DR. JOHN B. HAMILTON'S PLAN FOR REGULATING IMMIGRATION.\*—That every person intending to emigrate to the United States shall have a certificate from an American consul setting forth that he has not been convicted of any crime nor been a public charge or received public assistance, and that he is suffering from no contagious or chronic disease or disability. Satisfactory evidence of these conditions must be supplied by every intending emigrant, and filed in the consular office.

Dr. Hamilton recently visited the principal ports of embarkation of emigrants bound for the United States, and as a result of his observations makes suggestions that should not go unheeded.

There is no systematic medical examination of emigrants at any port. Some of the steamship lines require their surgeons to make a preliminary examination which, however, in no case compares with the examinations made at New York by the officers of the Marine Hospital Service, as the purposes are entirely different, that of the steamship company being to pass all that can be passed, while the purposes of the Marine Hospital inspection are to report all cases that are likely to become

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\*Annual Report of the Supervising Surgeon-General of the Marine Hospital Service for the year ending June 30, 1890.

a public charge. Recently fifteen insane persons and eleven idiots were reported to the Superintendent of Emigration by the medical officer at New York ; but, as the law does not allow the Superintendent the right to exclude immigrants, but only to submit such cases to the Collector, they are in some instances taken before the courts on a writ of *habeas corpus*, and, with the usual confusion of "expert testimony," a bright and skillful lawyer is nearly always able to secure the landing of any immigrant, provided he is not absolutely a raving maniac when brought into the court room. In the case of the 27 defective persons above cited, 4 of the insane and all of the idiots were permitted to land !

Dr. Hamilton is of opinion that, as the admission or rejection of an immigrant is a national affair, such suits should by law be required to be conducted in the United States Courts rather than in local courts, more or less subject to local influences. There is no country in the world in which citizenship is so cheaply obtained as in the United States—"the asylum of the oppressed," but he does not think that the founders contemplated that the country should wholly degenerate into an asylum and little else. The general question of restrictive measures is one of the most important that can be considered ; and, viewed from an American standpoint there is no doubt that the welfare of the country demands greater restrictions than the present laws seem to be able to furnish, not less in the interest of those now on the soil than in that of the natural born citizen.

It is a fact, says Dr. Hamilton, that most foreign countries do not encourage emigration to the United

States, or, if it is encouraged, it is of a class they can well afford to spare. It is not the successful merchant and the skillful artisan that emigrate. On the contrary, the man who fails, the class of criminals whom the authorities give "so many days to leave the town," the persons without employment, are those who naturally desire to emigrate. To these must be added that large proportion of emigrants who now come to join friends and relatives. It is the settled policy of most foreign governments to encourage the emigration to their own colonies of such intending emigrants as are desirable additions to the population. The vast number of 2,666,276 foreign people introduced into our political organization within the last six years, most of whom are entirely ignorant of our traditions, customs and laws, cannot be viewed without concern and apprehension.

Mr. Lodge of Massachusetts recently (December 1) introduced a bill in Congress "to regulate immigration." Its principal provisions are: That no alien shall be admitted into the United States who is an idiot, insane, a pauper, or liable to become a public charge, or who has been convicted of a felony or other infamous crime or misdemeanor, or who is a polygamist, anarchist, or nihilist, or who is hostile to the form of government or constitution of the United States, or who is afflicted with any loathsome or contagious disease, or who has entered into any contract to perform labor or service for any person, firm or company, or corporation. This section not to apply to professors in universities or ministers of the Gospel. That no alien shall be admitted into the United States without the certificate of

a consul or diplomatic representative, applied for at least three months prior to embarkation, setting forth that the holder is not obnoxious to any law of the United States in regard to immigration, that he is a person of good character and reputation, receives no assistance to enable him to emigrate, that he is self-supporting and capable of supporting a family, if he has any. That, if over twelve years of age, he can both read and write in his native language, and can read the constitution of the United States either in English or in his native language. That he is physically and mentally sound, in good health, and free from disease or deformity, as certified by a physician in good and regular standing known to the consul. It is made the duty of the consul or diplomatic representative to inquire into the character of each applicant and to require proof of all the facts certified; and any fraudulent issue of such certificate shall be punished by a fine of \$1,000 in each case. The applicant shall pay \$2.00 for such certificate.

That upon the arrival at any port of entry or other place of any citizens or subjects of any foreign government it shall be the duty of all commanders, officers and agents of the particular vessel, railroad train, or other vehicle of transportation, to report the name, number, nationality, and condition of every such passenger, before any of them are landed, to the Collector of the Port, who shall cause an inspection of all such passengers and examine their certificates. In cases of delay or detention such foreign persons shall be properly housed, fed and cared for. That every person, vessel, railroad, steamship, or transportation company, shall make sworn return of the immigrants

brought by them, and shall pay five dollars to the Collector for each immigrant brought by them to the United States. No vessel shall transport on any one voyage more than the proportion of one passenger to every five registered tons of such vessel. Immigrants not holding consular certificates shall be returned by and at the expense of the vessel which brought them here.

The Circuit and District Courts of the United States are invested with full jurisdiction of all causes, civil and criminal, arising under the provisions of this act; and no State court or court of the United States shall admit to citizenship any person, who by the provisions of this act is not permitted to come to or land in the United States, or who does not hold a consular certificate. The Secretary of the Treasury is charged with the duty of supervising immigration, and of regulating all matters pertaining thereto.

MOUNT ST. ELIAS EXPEDITION.—Mr. I. C. Russell, chief of the Mount St. Elias expedition, and Mr. Mark B. Kerr,\* the topographer, have made their reports to the National Geographic Society on explorations carried on last summer. These reports form a very interesting chapter in the year's record of scientific exploration. The work planned for the expedition was to make a topographical map of the region between Yakutat Bay and Mount St. Elias, and to study the glaciers and geology of the region. Mr. Russell, it will be remembered, traversed the Yukon region in 1889, the account

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\*The substance of these remarks is largely, and for the most part in the exact words of Mr. Russell, as addressed to a public audience in Washington on the evening of November 26, and of Mr. Kerr, as addressed to the National Geographic Society, at a meeting held November 28, to which the public was invited.

of that expedition being in the A. G. S. BULLETIN for March, 1890.

The party, consisting of nine, left Seattle, June 17, arriving at Sitka on the 24th. On the 26th they reached Port Mulgrave. From this point, on account of shoal water, surf and inclement weather, the journey was made in small boats until a landing was effected on the 30th, on the north shore of Yakutat Bay. The party camped at the base of a rugged mountain range trending south-east and north-west, separated from the sea by a low, densely wooded plateau, some thirty miles broad. One of the most interesting excursions made from the camp, says Mr. Russell, was a canoe trip to an island near the head of Yakutat Bay, which rises more than a thousand feet above the water, and furnishes an unobstructed view of the encircling mountains. At the immediate head of the bay one of the grandest glaciers of Alaska comes down to the water, and ends in a magnificent line of ice cliffs several miles in length and hundreds of feet high. A few miles inland is a towering snow-covered mountain peak from which this glacier derives its snow and ice. The mountain and the glacier were named in honor of the President of the National Geographic Society—Hon. Gardiner G. Hubbard.

On the north shore of Yakutat Bay, Mr. Kerr selected a base line across the moraine, 3,850 feet in length. The base was measured, Mr. Kerr says, very carefully twice by steel tape, stretched in 50-foot tangents from the top of one stake to the top of the next one, and each stake driven a uniform depth into the ground. The difference of elevation between the two ends was 49 feet, and the correction in reducing the line to the horizontal was



0.24 feet. The difference in the two measurements was three inches, and the intersection was perfect on the top of the tent near the bay shore, from stations W. B., Crater, Dome, and Yakutat, thus checking the measurement. The alignment was made by the transit instrument, and the elevations were taken by angulation and by cistern barometer. The instruments used in the work of the survey were transit, gradienter, sextant, cistern barometer, aneroid, and prismatic compass. Mr. Kerr was engaged until July 6th, in measuring the base line, extending triangulation and making a general topographic map. On the 5th of July, he took his first sights of Mounts Saint Elias and Cook, and by rough calculation found the heights to be 13,950 and 11,030 feet respectively.

The journey inland was found to be extremely difficult on account of the dense vegetation that covered all the lower slopes, and the rugged character of the glaciers, which for most of the way were either crevassed or covered by dirt and stones. The way to Mt. Saint Elias led along the borders of one of the largest glaciers in the world, of the Piedmont type,—a living illustration of the character of the continental ice sheet, that formerly covered all of New England and a large portion of Canada. It is hundreds of square miles in extent, and is fed by ice streams from the mountains of such volume that it has actually displaced the ocean. A little island formed of moraine materials, rising through the glacier, was named Blossom Island, on account of the beauty and luxuriance of the flowers that grew everywhere upon it, and this spot was chosen as a base camp from which expeditions were made to the higher

mountains. A pass leading westward was found near the head of a glacier which descends from the western slope of Mount Cook. It has an elevation of about 4,000 feet above the sea, and was called "Pinnacle pass." Descending this western slope another great glacier reaching far inland to the north of Mount Cook was reached, and named "Seward Glacier." Beyond the Seward glacier another opening named "Dome pass" was reached, leading westward. Crossing this pass, and descending, another floating river of ice was met, and the route of the explorers led up this glacier to the northern base of the immediate summit of Mount St. Elias.

The highest point was reached August 22d. All the difficult places and large crevasses had been passed, and about 2,000 feet remained to the summit of the divide. This saddle between St. Elias and a peak next was called Newton. It is about 11,500 feet high, and a clear slope of hard snow reaches without a break to the top of the mountain, about 4,000 feet above the saddle. At an elevation of 9,500 feet it began storming, and before morning four feet of snow had fallen. The party moved to a lower camp, finding their way with great difficulty through the storm of snow and wind. A second effort was made to reach the peak, but another snow storm more severe than the first was encountered. The attempt to reach the summit of Mount St. Elias was abandoned and the expedition returned to Blossom Island, after living thirty-five days above the snow line. Mr. Kerr obtained five determinations for the altitude of the mountain, which place it at 15,350. The expedition returned to Yakutat Bay about the

20th of September, and reached Port Townsend October 2d.

The results of the expedition include the discovery of a thoroughly practicable route by which the summit of the mountain can be reached; accurate measurements of glaciers and their rate of motion; geologic studies of great interest; and a contour and topographic map of a hitherto unknown region more than a thousand square miles in extent. Fossil plants and shell-fish were discovered 4,500 feet above the sea-level. The elevations of all the mountains of the region explored were found to be less than had formerly been supposed. St. Elias is not an ancient volcano as has been reported by sea captains, but is formed of sedimentary rocks. The peak is the end of a roof-like ridge, in which the rocks dip north-east. Mr. Russell says that the appearance of smoke which has been observed is doubtless due to the mist and dust caused by the great avalanches of rocks, which sometimes come down the mountain sides. The geographical position of Mount St. Elias is placed in latitude  $60^{\circ} 12'$ , longitude  $140^{\circ} 46'$ . The heights in feet of various peaks are given as follows: Augusta, 13,105; Cook, 12,370; Vancouver, 9,884; St. Elias, 15,350.

TABLE OF DETERMINATIONS OF MOUNT ST. ELIAS.

Date.	Authority.	Height in feet.
1786	La Pérouse.....	12,672
1791	Malaspina.....	17,851
1847	Russian Hydro. Chart.....	17,854
1847	Tebenkoff.....	16,938
1849	Buch, <i>Canarische Inseln</i> .....	16,758
1872	English Admiralty Chart.....	14,976
1874	U. S. Coast Survey.....	19,500
1890	Nat. Geographic Society.....	15,350

If this expedition had arrived at its highest point ten days earlier, the summit of Mount St. Elias would undoubtedly have been reached.

The Secretary of War in his annual report calls attention to the advisability of further and more complete explorations of the interior of Alaska. He says :

“Three or four reconnoissances have been made by officers of the army through portions of the territory, and the courses of several of its great navigable rivers have thus been determined. These expeditions, however, were inadequately prepared for the work of exploration, the journeys were necessarily made in very great haste and were confined to the rivers. No systematic exploration of the interior has ever been attempted by the government, and the topography, resources and capabilities of Alaska are practically unknown. In order to obtain exact and trustworthy information concerning this territory I have approved a proposition to organize a thoroughly equipped expedition to make a systematic exploration and survey of Alaska. The duty will be undertaken by competent officers and men with, in my opinion, a fair prospect of important results. I recommend that a sufficient appropriation be made by Congress for carrying the plan into effect.”

The Superintendent of the Coast and Geodetic Survey has had telegraphic communication, by way of San Francisco, from the two parties on the upper Yukon and Porcupine rivers, engaged in surveying the boundary line between Alaska and the British possessions. Mr. Turner, the chief of the Porcupine River party, completed his work on the 141st meridian last spring, and reached St. Michaels, where he will winter, August

20th. Mr. McGrath will spend the winter on the upper Yukon completing his astronomical observations. This is the first news from Turner since January last. Detailed reports have not yet come to hand.

Mr. Ivan Petroff has already travelled over 12,000 miles in Alaska on the work of collecting statistics for the Eleventh census. The schedules used cover the following subjects: White or civilized population; Native population; Churches, schools, canneries and fishing; Trade and commerce; Gold and silver mining; Coal mining. The enumeration is nearly completed, but the returns have been received only in parts; those from several interior districts cannot be obtained until next spring.

H.





